THE PHYSIOLOGY

OF

TEMPERANCE & TOTAL ABSTINENCE.

BEING

AN EXAMINATION OF THE EFFECTS OF

THE EXCESSIVE, MODERATE, AND OCCASIONAL USE OF

ALCOHOLIC LIQUORS

ON THE HEALTHY HUMAN SYSTEM.

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PREFACE.

THIS little volume may be considered, in some degree, as a new edition of the Essay "On the Use and Abuse of Alcoholic Liquors in Health and Disease," to which was awarded, in 1849, the prize of one hundred guineas, liberally offered by Mr. Joseph Eaton. Two large editions of that Essay, in its original form (which was especially addressed to the Medical Profession), having been disposed of, the Author has remodelled it with a view to its more extensive diffusion among the general Public; substituting a large amount of matter of more general interest, in the place of purely professional details; and so changing the arrangement of the whole, as to make the sequence of subjects more natural, and the line of argument more obvious. He has also added a short Glossary of those scientific terms, which he could scarcely avoid occasionally employing.

It is his object, in the first place (Prop. I.), to determine, by an examination of the mode in which Alcohol acts upon the healthy human body, when taken in a *poisonous* dose, or in such a quantity as to cause intoxication, what are the changes which it *tends* to produce in the regular course of vital action; next (Prop. II.), to show that the *direct* consequences of the habitual *excessive* use of Alcoholic liquors, as demonstrated by medical experience, are just such as might be predicted on these data; and thence (Prop. III.), to establish the strong probability, that a *remote* liability to many forms of disease is engendered by the habitual *moderate* use of these beverages. This conclusion is shown to be

onfirmed (Prop. IV.), by the manifestation of the like disorders, within a far shorter time, under such conditions as peculiarly favour the action of Alcohol on the body.

He then examines (Prop. V. VI.) into the validity of those *special* cases, which have been urged in justification of the *habitual* or *occasional* use of Alcoholic liquors; and shows that science and experience concur to prove that, so far from affording any assistance in the prolonged endurance of Bodily or Mental Exertion, of Cold, Heat, or Pestilential Air, or in the general Sustenance of Health, they tend in reality to depress the powers of the system.

He lastly (Prop. VII.), indicates the grounds on which he maintains that the *medicinal use* of Alcohol may be safely based, and the principal classes of cases in which he considers it justifiable.

In conclusion, the Author commends his little work to the candid consideration of those thoughtful readers, who, aware of the vast interests involved in a right appreciation of its subject, are disposed to bestow on its perusal some part of the attention which *their* importance demands.

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GLOSSARY OF SCIENTIFIC TERMS.

N.B.—Most of the Scientific Terms used in this Treatise are explained where they first occur; the following explanations and references, however, may serve to make them more intelligible to the General Reader, for whose use it is more especially designed.

Abnormal—irregular, contrary to rule.
Acute Diseases—severe, but of short duration.
Aeration of the blood—its interchange of gases with the air.
Asphyxia—suffocation for want of air.
Assimilation—conversion of food-material into living tissue.
Atrophy—deficient nutrition.
Azotized—containing, like animal flesh, much nitrogen.
Cerebritis—inflammation of the substance of the brain.
Cerebrum, or *Cerebral Hemispheres*—the great mass of the brain, the seat of the intellectual powers.
Chronic Diseases—not violent, but of long continuance.
Chylopoietic Viscera—the whole digestive apparatus concerned in the preparation of chyle.
Coma—profound insensibility.
Combustion, or *Combustive Process*—(§ 7, note.)
Congestion—over-fulness of blood in any part.
Degeneration—gradual deterioration of healthy structure.
Delirium Tremens—trembling delirium—(§ 26.)
Depurating—purifying the blood by the withdrawal of noxious matter.
Diagnostic—distinctive.
Disintegration—general breaking-up, or separation, of the component particles.
Dyspepsia—disorder of digestion.
Effete—used-up, of no further service.
Elimination—separation of certain matters from the blood.
Encephalon—the entire mass of the brain.
Endemic diseases—(§ 185, note.)
Epidemic diseases—(§ 185, note.)

Excretory processes—the removal of waste matters from the blood, by the Liver, Kidneys, Skin, Lungs, &c. (§ 6.)

Gastric—relating or belonging to the stomach.

Gastro-intestinal—belonging to the stomach and intestinal tube.

Hæmorrhage—discharge of blood from any part, by the giving-way of its vessels.

Hydro-carbonaceous—consisting chiefly of hydrogen and carbon.

Ingestion—the taking-in of food.

Malarious emanations—those proceeding from vegetable decomposition.

Medulla Oblongata—upward prolongation of the Spinal Cord, joining it to the brain.

Meningitis—inflammation of the surface of the brain.

Miasmatic emanations—those proceeding from animal decomposition.

Modus operandi—mode of action.

Morbific—productive of disease.

Mucous Membrane—the soft inner coat of the stomach, &c.

Normal—regular, according to rule.

Oxidation—union with oxygen.

Pabulum—properly food, or fodder; the material furnished by the blood to the nutritive or combustive processes.

Paralysis—palsy, loss of sensation or motion, or both, in a part.

Plasticity of the blood—its capacity to form organized tissue.

Plethoric—general over-fulness of blood.

Portal System—the blood-vessels passing from the walls of the alimentary canal to the liver.

Sensory Ganglia—centres of sensation at the base of the brain.

Sthenic—attended with strength.

Syncope—fainting; complete and sudden loss of sensation and motion, from failure of the heart's action.

Tubercular—Scrofulous disorder.

Zymotic diseases— (§ 185).



INTRODUCTION.

The following pages contain the results of inquiries in which the author has now been for several years engaged, in regard to the influence of Alcoholic liquors upon the Human system. When he first entered upon this investigation, he had adopted no foregone conclusion or rule of practice; and had, consequently, no disposition to make the facts square with preconceived views. He has throughout endeavoured to treat the subject as one of purely scientific inquiry; and has avoided mixing up, in his discussion of it, any other considerations than those which presented themselves to him as a Physiologist and a Physician. To the conclusions which he has been thus led to form, he has availed himself of every appropriate opportunity of giving unhesitating expression;—equally disregarding the opposition of those, who, without giving themselves the trouble of examining the evidence he has adduced, or of mastering the arguments he has built-up on the sure foundation of facts, dogmatically affirm that he has gone a great deal too far, in stigmatizing as injurious what is really beneficial or at least innocent;—and indifferent, on the other hand, to the assertions of such, as, with a like contempt of whatever does not accord with their cherished opinions, accuse him of inconsistency in not denouncing the use of alcohol in all forms and under all circumstances.

In setting forth the following Propositions as expressive of what he deems to be the true relation of Alcohol to the living Human body, the author is peculiarly desirous that he should be distinctly understood as not having *adopted* them for his creed in the first instance, and set himself to *prove* them afterwards; and also as by no means desiring that any of his readers should take them upon trust, and acquiesce

in them merely because advanced by him. He has simply employed this form, as the one which seemed to him best adapted to embody the results of his inquiries, and to present them to others for their own examination. It has been his constant aim to distinguish what is to be received as *probable* truth, from that which he considers to have been *demonstrated;* and on no point has he expressed himself more strongly, than he feels himself justified in doing on scientific grounds alone.

The mutual connection of the Propositions which are to be afterwards discussed *seriatim*, will be best seen by regarding them as parts of one continuous series.

I. The action of Alcohol upon the animal body in health is essentially *poisonous;* producing such a disturbance in the regular current of vital action, as, when a sufficient dose or succession of doses is administered, becomes fatal.

II. The consequences of the habitual *excessive* use of Alcoholic Liquors, as proved by the experience of the Medical Profession, and generally admitted by Medical writers, are precisely such as the study of its effects in poisonous doses would lead us to anticipate; various Diseases being thus induced in the organs whose actions are peculiarly liable to derangement from the presence of alcohol in the system.

III. The habitual *moderate* use of Alcoholic Liquors has a tendency to produce morbid actions in those organs especially acted-on by them, which ultimately manifest themselves in various chronic diseases of advanced life.

IV. The preceding conclusion, as to the remotely injurious effects of the "moderate" use of Alcoholic Liquors, is borne out by the comparative rapidity with which similar results develope themselves in tropical climates.

V. The capacity of the healthy human system to sustain as much bodily or mental labour as it can be legitimately called on to perform, and to resist the extremes of heat and cold, as well as other depressing agencies, is not augmented (as commonly supposed) by the use of Alcoholic Liquors; but, on the contrary, their use, under such circumstances tends positively to its impairment.

VI. Although there are certain exceptional cases, in which

occasional, or even habitual, recourse may be had to Alcoholic Liquors with apparent advantage, the number of cases in which permanent benefit is gained by their use is much less than is generally supposed; their effect being rather to palliate the results of departures from the laws of health, than to antagonize or remove their causes; and any temporary increase of power being usually purchased at the expense of a greater subsequent diminution in the capacity of exerting it.

VII. Whilst the habitual use of Alcoholic Liquors, even in the most moderate amount, is likely (except in a few rare instances) to be injurious rather than beneficial, great benefit may be derived in the treatment of Disease from the *medicinal* use of Alcohol in appropriate cases.

It is proper here to explain, that, under the head of "Alcoholic Liquors," *all* those beverages are included which contain Alcohol in sufficient amount to produce its characteristic action on the system. There is no adequate reason for making any other distinction among these, than such as is founded upon the relative amounts of Alcohol which they contain; distilled *Spirits* of course ranking highest, then *Wines* (such, at least, as are ordinarily employed in this country), and lastly, *Cider* and *Malt-Liquors*. There are some who, whilst admitting the noxious effects of distilled spirits, assert that wines, if unbrandied, are quite wholesome, and that it is most erroneous to charge malt-liquors with any pernicious effects. But there is no other difference in the *immediate* action of these liquors on the system, than that which depends on the relative quantity of Alcohol which they contain; for unbrandied wines and malt-liquors, when taken in a sufficient amount at any one time, produce *intoxication* with no less certainty than the most fiery spirit diluted to the same degree; and the variations observable in their action, which depend upon the other ingredients of the respective liquors, do not affect this, their essential characteristic. From *all* these liquors Alcohol may be obtained by those ordinary chemical processes, which only *separate* it from the water and solid matters with which it is blended in them; and the following are the proportions in which, as stated by Mr. Brande, it is thus proved to exist in the varieties most in use, the *volume* of Alcohol

(specific gravity ·825) in 100 measures of the liquor, being stated for each:

SPIRITS.		Burgundy	14·57
Whiskey	54·11	Champagne	12·80
Rum	53·68	Gooseberry	11·84
Brandy	53·39	Hock	12·08
Hollands	51·60	Orange	11·26
WINES.		Elder	08·79
Raisin	25·12		
Madeira	24·17	Cider	07·54
Port	22·96	Perry	07·26
Cape	20·51	Burton Ale	08·88
Teneriffe	19·79	Edinburgh Ale	06·20
Sherry	19·17	Brown Stout	06·80
Bucellas	18·49	London Porter	04·20
Claret	15·10	Small Beer	01·28

Although this Essay is only designed to investigate the Physiological bearings of the Abstinence question, yet the Author cannot allow it to go forth without expressing his conviction, that whilst there are adequate *physical* reasons for abstinence from the *habitual* use of even a "moderate" quantity of Alcoholic Liquors, there are also strong *moral* grounds for abstinence from that *occasional* use of them, which is too frequently thought to be requisite for social enjoyment, and to form an essential part of the rites of hospitality. Few, save those who have expressly inquired into the subject, have any idea of the extent of the *social* evils resulting from Intemperance, or of the degree in which they press upon every member of the community. He believes that among those who *have* thus inquired, there is but one opinion as to the fact, that, of all the causes which are at present conspiring to degrade the physical, moral, and intellectual condition of the mass of the people, there is not one to be compared in potency with the *abuse of Alcoholic Liquors;* and that, if this could be done away with, the removal of all the other causes would be immeasurably promoted. Every one who wishes well to his kind, therefore, must be interested in the inquiry how this monster-evil can be best eradicated.

Now the Author considers, that the best answer to this inquiry has been found in the results of experience. A fair

trial has been given, both in this country and in the United States, to societies which advocated the principle of *Temperance*, and which enlisted in their support a large number of intelligent and influential men; but it has been found that little or no good has been effected by them, among the classes on whom it was most desirable that their influence should be exerted, except where those who were induced to join them really adopted the *Total Abstinence* principle. Though he agrees fully with those who maintain, that *if* all the world would be *really temperate*, there would be no need of Total Abstinence Societies, the Author cannot adopt the inference that those who desire to promote the temperance cause may legitimately rest satisfied with this measure of advocacy. For sad experience has shown, that a large proportion of mankind *cannot*, partly for want of the self-restraint which proceeds from moral and religious culture, be temperate in the use of Alcoholic Liquors; and that the reformation of those who have acquired habits of intemperance, *cannot* be accomplished by any means short of entire abstinence from fermented liquors. Further, experience has proved that, in the present dearth of effectual education among the masses, and with the existing temptations to intemperance arising out of the force of example, the almost compulsory drinking-usages of numerous trades, and the encouragement which in various ways is given to the abuse of Alcoholic Liquors, nothing less than entire abstinence can prevent the continuance, in the rising generation, of the terrible evils which we have at present to deplore. And lastly, experience has also proved that this reformation cannot be carried to its required extent, without the co-operation of the educated classes; and that their influence can only be effectually exerted by *example*.

There is no case in which the superiority of example over mere precept is more decided and more obvious. "I practise total abstinence myself," is found to be worth a thousand exhortations; and the lamentable failure of the advocates who cannot employ this inducement, should lead all those whose position calls upon then to exert their influence, to a serious consideration of the claims which their duty to society should set up, in opposition to their individual feelings of taste or comfort. There is surely no case that more

imperatively demands the exercise of that Christian self-denial, which was practised and enjoyed by the Apostle Paul; who felt himself called upon to abstain from every indulgence, however innocent in itself, which could endanger a brother's soul. For though he regarded flesh and wine as "good creatures of God," yet he nobly lays down as his own rule—"*If meat make my brother to offend, I will eat no meat while the world standeth, lest I make my brother to offend.*" And this same rule he urges upon the individual members of the Churches he addressed. "*Take heed,*" he says to the Corinthians, "lest by any means your liberty become *a stumbling-block to those who are weak.*" In a like spirit, he enjoins the Romans "*not to put a stumbling-block, or an occasion of falling, in a brother's way,*" and he gives to this general precept the following special application:—"*It is good neither to eat flesh, nor to drink wine, nor anything whereby thy brother stumbleth, or is offended, or is made weak.*"

Surely there *never* was a case to which these warnings had a more special or pointed application, than they have to the use of Alcoholic beverages, as ordinarily practised in this country; for these, even if they could be proved to exert no prejudicial influence on such as employ them in "moderation," must be admitted to become most fatal stumbling-blocks to myriads with whom "moderation" in their use is practically impossible.

Extracts from the Registrar-General's Reports.

Number of Deaths from Intemperance and Delirium Tremens, in the Metropolitan Districts, during the 13 *years,* 1840—52.

	1840	1841	1842	1843	1844	1845	1846	1847	1848	1849	1850	1851	1852
Intemperance	22	30	22	34	42	67	90	76	57	64	74	67	80
Delirium Tremens ..	85	83	76	95	95	113	153	156	141	164	155	130	123

Number of Deaths from Intemperance and Delirium Tremens, in England and Wales, in the year 1847, *at different Ages.*

	15–20	20–25	25–30	30–35	35–40	40–45	45–50	50–55	55–60	60–70	70–80	Total
Intemperance	5	12	23	24	32	35	28	36	24	20	8	256
Delirium Tremens......	2	18	50	81	85	82	67	50	37	32	12	516

PROPOSITION I.

THE ACTION OF ALCOHOL UPON THE ANIMAL BODY IN HEALTH IS ESSENTIALLY POISONOUS; PRODUCING SUCH A DISTURBANCE IN THE REGULAR CURRENT OF VITAL ACTION, AS, WHEN A SUFFICIENT DOSE, OR SUCCESSION OF DOSES, IS ADMINISTERED, BECOMES FATAL.

1. *Poisoning by Alcohol in large doses.*—The poisonous action of alcohol upon the living body is rendered obvious by the fatal results of its introduction into the stomach in adequate quantity, either in a pure form, or when moderately diluted, as in ordinary spirituous liquors. The more concentrated its condition, the more rapidly does death follow its administration. There do not seem to be any cases on record, in which absolute Alcohol has been taken by Man in a poisonous dose; but its effects may be judged of by the following experiments performed by Dr. Percy* upon animals:

a. About 2½ oz. of alcohol (sp. grav. ·850) having been injected into the stomach of a full-grown spaniel bitch, the animal *immediately* uttered a loud plaintive cry and fell lifeless to the ground. Not a gasp was afterwards taken, nor, after the lapse of a minute or two, could a single pulsation of the heart be felt. "Never," says Dr. Percy, "did I see every spark of vitality more effectually and more instantaneously extinguished." The rapidity of the fatal result in this instance (and this, too, from an unusually small quantity of the poison) appears to have depended on the fact, that the animal had been but scantily supplied with nutriment for a day or two previously; so that the stomach was in a condition which (as is well known to physiologists) is peculiarly favourable to that absorption of the poison into the circulating blood, to which, as will presently appear, its effects upon the system are in great measure due.—The mode in which death

* See his "Experimental Enquiry concerning the presence of Alcohol in the Ventricles of the Brain, after poisoning by that Liquid," pp. 59, 62, 63 and 97.

occurred in this case, was almost precisely identical with that of poisoning by a strong dose of *prussic acid.*

b. In another experiment, 6 oz. of alcohol having been injected into the stomach of a large full-grown mongrel dog, entire loss of sensibility and voluntary power almost immediately succeeded, the animal falling prostrate on one side, and never afterwards moving a limb; but the movements of respiration continued for rather more than an hour, gradually becoming slower and more laborious; and the heart's action was prolonged for a few minutes more, the last pulsation taking place 1 h. 20 min. after the introduction of the poison into the stomach.—All the phenomena of this case essentially corresponded with those of poisoning by a large dose of *opium* or some other narcotic substance; and although the stomach presented appearances of incipient inflammation, yet it was obviously not to this that the fatal result was due.

c. In a third experiment, 3 oz. of alcohol having been injected into the stomach of a powerful bull-terrier bitch, the animal howled loudly once or twice, and then fell prostrate, with slight convulsive extension of the trunk and limbs. Death appeared to have already supervened, as in experiment *a*, but it was only apparent; for although the respiration was for a time arrested, the heart continued steadily to beat, and after the lapse of three minutes a sudden deep inspiration was taken. The respiratory function was gradually restored, but continued oppressed; and it was not until 40 minutes after the introduction of the poison, that the animal gave any signs of returning consciousness and voluntary power. After the lapse of about an hour, she raised herself and staggered a few steps, but the hinder limbs seemed almost paralyzed; the pulse and respiration had become more natural. She soon, however, lay down again, and did not make any effort to move, but continued moaning, apparently from pain, at each inspiration. The pulse, which was from the first weak and irregular, increased in rapidity with still greater weakness; and the poor animal gradually sunk, death occurring about eight hours after the introduction of the poison.—Now in this case, the effect of the alcohol upon the nervous system, although so great for a time as to induce almost complete prostration of the vital powers, was transient, and had been nearly recovered from, when (as was ascertained by examination after death) violent inflammation of the lining membrane of the stomach and intestines came on, and it was obviously to this that the fatal result was due; hence the alcohol here acted as an *irritant* poison, after its *narcotic* effects had in great part subsided. It is particularly worthy of note, that in this case the blood was *everywhere fluid,* not a trace of a clot being found.

d. A fourth experiment exhibited the effects of alcohol upon the nervous system in a less severe form, and without any secondary disorder. About 2½ oz. of the poison having been injected into the stomach of a full-grown spaniel bitch, symptoms of intoxication soon came on; the animal lost the power of standing, and on attempting to raise her head let it fall again as a dead weight; the jaws began to act as in mastication, the fore-legs moved as in running, and the tail wagged constantly, with occasional whining. About twenty-five minutes after

the introduction of the alcohol, the animal vomited a kind of frothy mucus; she then became extremely restless, at one time writhing and contorting her body in all directions, and occasionally moaning, whining, and howling loudly, as if suffering severe pain; and at another time appearing to be in a state of delirious excitement, the tail and all the extremities being affected with rapid movement, as if she were endeavouring to swim, or in swift pursuit of some object of prey, and once, indeed, she violently shook her head, as if she had grasped her imaginary victim. About nine hours afterwards, she was found sitting up and attempting to walk, but the hind-legs seemed paralyzed; a few hours subsequently she ate food, and seemed comparatively well; but for some days, there appeared to be a want of voluntary power over the hind-legs.

2. The effects of large doses of strong Alcoholic Liquors upon Man, are precisely of the same kind with those which have been described as presenting themselves after the introduction of pure alcohol into the stomachs of animals. Examples of this kind unfortunately present themselves so frequently, that there is no difficulty in collecting materials for the comparison; these being furnished by the recklessness which leads men to make the most dangerous experiments upon themselves, either for the gratification of their love of drink, or for the exhibition of their prowess in defying its effects. The following cases are selected as exhibiting the three different modes in which we have seen that death may supervene:—in the first place, from the immediate shock to the nervous system;—in the second, from less complete but continued torpor;—in the third, from secondary inflammation of the stomach and intestines.

a. Two soldiers, quartered in a suburb of Paris, having each drunk for a wager, four litres (about *seven pints*) of brandy, died, one on the spot, the other whilst being conveyed to the military hospital.*—A man was some years ago brought dead into the Westminster Hospital, who had just dropped down dead, almost immediately after drinking a quart of gin for a wager.†

b. A chimney-sweep drank eighteen glasses of rum in quick succession (upwards of a quart); he soon became perfectly insensible and motionless, but his respiration and circulation continued for about six hours, when he died.‡—A case of poisoning by gin in a boy of eight years old is related by Dr. Chowne, in which life continued for sixty-

* Orfila, "Traité de Toxicologie," cinquième édit., tom. ii., p. 685.
† Dr. Cooke's "Treatise on Nervous Diseases, vol. i., p. 221.
‡ "Lancet," vol. x., p. 571.

seven hours and a half, the child remaining in a state of partial insensibility; and death seemed to take place from slow suffocation, no inflammation of the stomach being found after death.*

c. A man drank a quantity of pure rum, supposed about two pints; he shortly became insensible, and was found in that state under a hedge, near the West India Docks. A surgeon passing by, bled him, and ordered him to be sent to the London Hospital. When admitted, he was in a state of total insensibility, and presented all the symptoms of narcotic poisoning. An emetic was given, which operated well; but as the same symptoms continued, he was bled again largely a few hours afterwards, and his head was shaved. On the following morning he was sensible when roused, but was heavy and drowsy; during the day, however, he seemed to be gradually recovering, and continued to amend on the day following. On the third day, however, he complained of pain in the region of the stomach, and this was succeeded by delirium, which at first was furious, and afterwards slow and rambling; and he gradually sunk on the fourth night after taking the rum. On examination after death, there was found to be extensive inflammation of the intestines.†

Few persons have any idea of the number of deaths, which are continually taking place from the *direct* results of alcoholic intoxication. In the Report of the Registrar-General for 1848, we find that no fewer than 278 deaths (211 males, 67 females) in England and Wales are set down to this cause; and there is too much reason for believing that this number is far from representing the whole amount (see Note, p. 6).

3. The *mode* in which the Alcoholic poison occasions death, has been clearly made out by the experiments of Dr. Percy and others. The fluid is first absorbed from the stomach into the blood-vessels of its walls, and thence passes into the general current of the circulating blood, with which it mingles, so as to be conveyed to every part of the body. This has been proved by the experiments of MM. Bouchardat and Sandras, who detected alcohol in the blood of the veins returning from the stomach; and by those of Dr. Percy, who found it in the general mass of the blood. So rapidly may the process of absorption take place, that in the first of the experiments just now quoted (§ 1, *a*), the stomach was found to have been completely emptied of alcohol, although scarcely a minute elapsed between its introduction and the death of the animal. The suddenness of the fatal result in this instance, must be attributed to the strength

* "Lancet," 1838-9, vol. ii., p. 238.

† Dr. Cooke "On Nervous Diseases," vol. i., p. 219.

of the depressing agency of the blood thus poisoned, upon the centres of the Nervous System; this being sufficient, not merely to produce an instant annihilation of their own powers, so as at once to destroy all sensibility and power of voluntary movement, but also to occasion an immediate cessation of the Heart's action,—just as when death is immediately produced by a severe blow upon the head or stomach, which does not produce any change that can be discovered in the dead body.

4. When the agency of the poison is less potent, it induces that suspension of the functional activity of the *brain*, which constitutes the state known as *Coma;* which consists in the abolition of all sensibility and mental power, and in the complete cessation of voluntary movement. This may vary in intensity, however, between a state resembling deep ordinary sleep, from which the individual may be so far aroused as to give manifestations of sensibility, and a torpor as profound as that of apoplexy, in which no indication of consciousness can be obtained. The former condition is not attended with immediate danger; but in the latter, there is a serious risk of the extension of the torpor to other parts of the nervous centres, and especially to that highest portion of the spinal cord in immediate connection with the brain (known as the *Medulla Oblongata*), which is the seat of the central power whereby the movements of respiration are sustained. If this should be affected, these movements become less frequent than they should be, and are imperfectly performed; and thus the blood comes to be insufficiently aërated, its condition being precisely the same as in cases of gradual Asphyxia (suffocation) induced by other means. When a fatal termination occurs, in this form of alcoholic poisoning, it is usually attributable, as in apoplexy, to the want of oxygenation of the blood; which is shown by the turgidity of the whole venous system, manifesting itself in the fulness and lividity of the face, the prominence of the eyes, and the blueness of the lips. As in other cases of narcotic poisoning, the pupils are imperfectly or not at all sensible to light; there is frequently strabismus (squinting); and there are often general convulsions, or spasms of particular parts. As the respiration becomes slower, the pulse, which was at first quick and excited,

becomes feeble, small, and slow, gradually ceasing to be perceptible; and the heart's action at last comes to a stand, not (as in the previous case) from the direct impression made by the poison, but as a consequence of the obstruction to the passage of blood through the lungs, which is created by its want of aëration. As might be expected, the temperature falls, especially in the limbs, with the diminution in the vigour of the circulation; though that of the head generally remains high to a late period.

5. In such cases of Alcoholic poisoning, the appearances usually resemble, more or less closely, those of Asphyxia; the right side of the heart, the pulmonary arteries, and the systemic veins, being loaded with blood; whilst the left cavities and the arterial system are comparatively empty, the blood which they do contain being dark. The sinuses and the whole venous system of the brain are turgid with dark blood; and serous effusion is usually found within the ventricles, or beneath the arachnoid; this, however, being variable in its amount. The substance of the brain is unusually white and firm, as if it had lain in alcohol for an hour or two. The liver, spleen, and kidneys are loaded with venous blood; and the air-passages of the lungs contain more or less of frothy mucus. The stomach usually exhibits but little departure from its normal condition, except in cases where drunkenness has been habitual, or where the fatal dose has been taken in a very concentrated form. In the former case, the mucous coat is usually found thicker, softer, and more vascular than usual; this change sometimes extending even throughout the entire length of the small intestines. In rarer instances, the coats of the stomach are remarkably thickened and hardened.* A most important alteration is usually observable in the condition of the *blood*, which is either fluid or coagulates imperfectly; and although this may be partly attributed to the deficiency of respiration (which has a tendency to produce the same condition), yet there can be no doubt that it is partly the consequence of the directly-poisonous influence of the alcohol on the blood, since the same result happens when

* See Dr. Ogston's Memoir, in the "Edinburgh Medical and Surgical Journal," vol. xl., and Dr. Peters, in "New York Journal of Medicine," vol. iii.

death has been *immediately* produced by the shock communicated to the heart. The fact, clearly ascertained by Dr. Percy, that alcohol may be extracted, not merely from the blood, but from the substance of the brain, and from the membranous walls of the stomach, shows that its operation upon these organs is fairly attributable to its intimate diffusion through their texture by means of the circulating current. He found, moreover, that alcohol existed in the substance of the *brain* of animals poisoned with it, in considerably greater proportion than in an equivalent quantity of blood;—a fact of great importance, as showing how directly and immediately the whole nutrition and vital activity of the Nervous System must be affected by the presence of alcohol in the blood; that substance being thus specially drawn out of the circulating current by the nervous matter, and incorporated with its substance, in such a manner as to change, when in sufficient amount, its physical as well as its chemical properties. It was also found by Dr. Percy, that the coats of the *stomach*, in animals poisoned by alcohol, were so thoroughly imbued with it through their whole thickness, that no washing or maceration could remove it. The only cases in which this poison could not thus be detected in the tissues, were those in which life had been prolonged for a sufficient length of time, to allow of its elimination from the blood in the manner to be presently described (§ 5). Precisely the same effects upon the nervous system are produced by the injection of alcohol into any part of the circulating current, as by its introduction into the stomach.—It is comparatively rare for death to take place from inflammation of the stomach, produced by the local action of the alcohol, if its narcotic effects should be recovered from. Generally speaking, if the respiratory movements be not seriously retarded, and the most unfavourable symptoms do not present themselves, the ill consequences of the dose of alcohol pass off in a great measure within twenty-four hours; though cases occasionally present themselves, in which even fatal inflammation of the alimentary canal subsequently comes on (§ 2 *c*).

6. This early cessation of the injurious effects of Alcohol, indicates that the poison itself is in some way removed from the blood; and thus is quite accordant with the general

principle common to poisons, to medicinal substances, and even to the proper materials of the body itself, when introduced in excess,—that the living system tends to free itself from matters whose presence is injurious to it, getting rid of them by means of some one or more of the excretory processes, which withdraw them from the circulating current, and convey them out of the body. It is by means of th' Urinary secretion, that the greater number of those su' stances are thus removed, which are not capable of being entirely disposed-of by the combustive process; but compounds of carbon, hydrogen, and oxygen, which, by a higher oxidation, are converted into carbonic acid and water, are for the most part withdrawn under this form by the Lungs. If, however, they should be introduced into the blood in great excess, such substances may pass into the urine or other excretions, without undergoing combustion; the respiratory process not being sufficiently active to remove them within a brief space of time; thus, if a large quantity of sugar be at once thrown into the circulating current, a portion finds its way into the urine, although, if more gradually introduced, the whole will be gradually removed by the respiratory process. The analyses of Dr. Percy have shown that Alcohol, when largely present in the blood, finds its way into the *urine* (contrary to the statements of some physiologists) and also into the *bile*. The alcoholic odour of the *breath* is a sufficient indication that the vapour of alcohol may be exhaled as such from the lungs in the act of respiration; and as a similar odour may often be recognized as proceeding from the person generally, it seems probable that an exhalation of alcoholic vapour takes place also from the *skin*.—But it seems to be only where the quantity of Alcohol in the blood is excessive, that it thus finds its way unchanged into the excretions; and even then, the quantity which is thus removed appears to be small, in comparison with that which, having undergone oxidation, *passes off in the form of carbonic acid and water in the ordinary process of Respiration*, this alone being sufficient to purify the blood from its alcoholic contamination, when the quantity that is contained in it is not too great to be thus disposed of. For this combustion of alcohol, a corresponding supply of oxygen is requisite; and as the amount of this is limited,

it must be withdrawn from *other* substances which are waiting to be got-rid-of by the combustive process, and the accumulation of which must deteriorate the character of the vital fluid. As this is a principle of extreme importance, and one which will be frequently referred-to hereafter, it is desirable here to stop to inquire a little more fully into the nature of the respiratory process, its relations to the vital economy generally, and the mode in which it is affected by the presence of alcohol in the blood.

7. The act of Respiration is subsidiary to a process of *combustion** which is constantly taking place within the body; atmospheric oxygen being introduced into the blood through the lungs, and carbonic acid and watery vapour being given off through the same channel; just as, in a lamp or furnace, atmospheric oxygen enters below the flame, and carbonic acid and watery vapour are discharged through the chimney or vent. Now the purposes which this process is destined to fulfil in the living animal body, are manifold; but we shall fix our attention on one group of actions alone. The peculiar vital activity of the Nervous and Muscular systems, which manifests itself in sensation, motion, etc., is entirely dependent upon chemical changes in those tissues, which can only be sustained by a constant supply of oxygen through the blood; and in proportion to the degree of activity which they are called-upon to put forth, are the quantity of oxygen that is required for consumption, and the amount of the components of those tissues that are reduced to the state of dead or effete matter. This matter is received back into the current of circulating blood, that it may be conveyed to the excretory organs, by which it may be removed from the system; that part of it which cannot be turned to any account whatever, is at once separated by the kidneys; but by far the larger portion of it is gradually applied to the maintenance of the temperature of the body, by being subjected to the combustive process, the products of which are discharged through the lungs. Now if any cause should obstruct the perfect performance of this

* The term *combustion* is now employed in a much more extended sense than formerly; namely, to designate the process of oxidation (especially of organic compounds), whether accompanied with a sensible disengagement of light and heat, or not.

process of oxidation, the effete matter, instead of being removed from the blood in a fully-oxidized condition nearly as fast as it enters it, is only partially got-rid-of; and it thus tends to accumulate in the circulating current, or is discharged in some lower form of oxidation,—just as when a lamp or a furnace *smokes*, from being supplied with oxygen in an insufficient degree to effect perfect combustion.* And among other evidences of this fact, which the experience of every one will enable him to recognise, is the offensive odour which proceeds from the persons of those who have been for some time pent-up in ill-ventilated apartments, and which helps, with the accumulated carbonic acid of the respiration, to contaminate the whole atmosphere.—Thus, then, we may liken the living body to a Manufactory, wherein various operations are going on, which involve the production of matters too noxious to be kept in it; for the consumption of these a furnace is provided, which, when in full operation, burns them off as fast as they are produced, and thus gives their components back to the atmosphere in the least injurious form; and the heat which is thus generated, serves to warm the manufactory. But if the access of air to the furnace be limited by partially cutting-off the draught, or more of the offensive fuel be brought to it than it can thoroughly consume, then the offensive matter is either got rid of by an imperfect combustion, the products of which have not lost their noxious character, or it accumulates within the building, to the great discomfort and injury of all exposed to its effluvia.

8. Now it is one of the properties of Alcohol, that it so readily undergoes combustion when exposed under the requisite conditions to the contact of oxygen, as to prevent the oxygenation of other substances whose affinity for oxygen is less. Of this we have a familiar example, in its well-known power of preserving bodies which have a tendency to putrefaction; for that process, which cannot take place without oxygen, is prevented by the prior appropriation of that element to the combustion of the alcohol in

* It is a very curious and important confirmation of this view, that acids have been recently detected in certain animal excretions, which are closely analogous to, and one of them actually identical with, those mingled with *soot* in the smoke of badly-constructed furnaces.

which such substances may be immersed. So if—to revert to our previous comparison—whilst our furnace-fire is effectually doing its duty in consuming all the noxious products of our manufactory, some alcohol be poured on the flame, *this* will immediately blaze up, undergoing as rapid a combustion as the limited supply of oxygen will allow, and thus checking for a time the combustion of the offensive fuel, which the fire was previously serving to consume. Hence it will in effect produce exactly the same result, in regard to these substances, as that which would be occasioned by cutting off the draught of air; for they must remain almost or completely unconsumed, so long as the alcohol remains to set up the first claim on the limited supply of oxygen. That such is really the case in regard to the blood—*that the presence of Alcohol in the circulating current does interfere with the processes to which the function of Respiration is normally subservient*—appears from the fact which has been verified by many observers, that its introduction almost immediately causes the *arterial* blood to present the *venous* aspect; whilst, again, the introduction of Alcohol into the blood has the effect (as has been determined by the careful and repeated experiments of Dr. Prout and Vierordt) of occasioning a considerable diminution in the per-centage of carbonic acid in the expired air,—this diminution continuing so long as unconsumed Alcohol remains in the blood, and then giving place to a sudden and decided increase.

9. *Alcoholic Intoxication.*—Having thus considered the effects of alcohol upon the living body, as exhibited in their most potent form, we shall go on to enquire into that less violent, but unhappily far more frequent, disturbance of its functions, which is commonly known under the term Intoxication* or Drunkenness. The phenomena of this condition

* It is worthy of notice that the term *intoxication,* though usually restricted in this country to the effects of Alcohol and other substances which produce analogous effects, really implies the introduction of a *poison* into the system; and it is used in this larger sense by continental writers, who continually speak of "arsenical intoxication," "iodine intoxication," "saturnine (lead) intoxication," &c. The fact that a term which is the direct etymological equivalent of *poisoning,* should be in common use in this country, to designate the ordinary results of the ingestion of alcoholic liquors, is not without its significance; for, if the classical term "intoxication" be habitually employed as the equivalent

will be found to correspond so closely with those of alcoholic poisoning, and the one state to pass by such imperceptible gradations into the other, that no definite line of demarcation can be drawn between the two. Like other narcotic poisons, alcohol has a primary *stimulant* action, which manifests itself when the dose is not sufficient to produce an immediate depression of the nervous power. Hence, among the *first* effects of the ingestion of alcoholic liquors, in sufficient amount to produce their characteristic influence, are, in most persons, an increase in the force and rapidity or the heart's contractions; producing a full, frequent, and strong pulse. With this, there seems to be a general exaltation of the organic functions; the appetite and the digestive power being increased, and the secretions augmented, especially those of the skin and kidneys. But it is obvious that the brain is specially acted on by the stimulus; for we observe all the manifestations of an excited action in it—such as talkativeness, rapidity and variety of thought, exhilaration of the spirits, animation of the features and gestures, flushed countenance, and suffusion of the eyes. During slight intoxication, the prevailing dispositions and pursuits are often made manifest; and hence the saying, "In vino veritas,"—(a drunken man lets out the truth). The irritable and ill-tempered become quarrelsome; the weak and silly are boisterous with laughter and mirth, and profuse in offers of service; and the sad and hypochondriacal readily burst into tears, and dwell on mournful topics. It sometimes happens, however, that men habitually melancholy become highly mirthful, when they have drunk enough to excite them; but this seems rather to be the case when the melancholy results from external depressing influences, than when it is constitutional; and hence it is, that too many persons in circumstances of distress or difficulty, have recourse to the bottle for temporary solace from their cares. This state of excitement, however, by no means arises from a *uniform exaltation* of the mental powers; it is rather in some degree a *perversion* of them. For that Voluntary control over the current of thought, which is the distinguish-

of the Saxon "drunkenness," we are justified by the English meaning of that classical term, in asserting that *the condition of drunkenness, in all its stages, is one of poisoning.*

ing character of the sane mind of Man, is considerably weakened, so that the heightened imagination and enlivened fancy have more unrestricted exercise; so, whilst ideas and images succeed each other in the mind with marvellous readiness, no single train of thought can be carried out with the same continuity as in the state of perfect sobriety; and the passions and emotions are more easily aroused, and are less capable of being restrained by an effort of the will. In all this we see that, whilst there is an exaltation of the *automatic* activity of the mind, there is with this a weakening of that *power of self-direction* which is the source of our freedom and responsibility; and such is precisely the nature of the incipient stage of Insanity.

10. If no more liquor be taken than is sufficient to produce this condition, it gradually subsides, and is followed by a state of the opposite character; the appetite, the digestive power, and the organic functions in general, being lowered in activity, the skin becoming dry, the secretions diminished, the spirits depressed, and the power of mental exertion for a time impaired. For this condition, sleep with abstinence (not merely from a renewal of the stimulus, but from more food than the stomach really demands) are the most effectual remedies.

11. If the first dose of Alcohol be such as to produce more potent effects, or if (as in ordinary intoxication) it be renewed after the first effects have already been manifested, the *second* stage is induced, in which not merely the intellectual but the sensorial apparatus is disturbed. The voluntary control over the direction of the thoughts is completely lost, and the excitement has more the character of delirium: the ideas becoming confused, the reasoning powers disordered, and the passions more vehement. At the same time, giddiness, double vision, ringing in the ears, and various other sensory illusions, occur; the muscular movements become tremulous and unsteady, the voice thick, the eyes vacant, and the face commonly pale. There is now an entire loss of the power of self-direction; so that the individual who has thus abandoned himself to the domination of his passions, and has suspended his capacity of reasoning, is truly insane for the time, and is dangerous both to himself

and to others; and this alike as regards persons and property. The number of deaths arising out of intoxication, through accident, suicide, or murder, is so great as to have been estimated by competent authorities, as giving occasion (with those which arise from the directly poisonous effects of alcohol) to more than half of all the inquests that are held by the coroner. Thus, out of 1500 inquests annually held by Mr. Wakley in the western division of Middlesex, 900 are considered by him to be produced by hard drinking; and he states that he has reason to believe that, besides these, from 10,000 to 15,000 persons die annually in the metropolis from the effects of gin-drinking, upon whom no inquests are held. In the Report of the Chaplain to the Preston House of Correction for 1847, Mr. Heyes, the Coroner, says: "I have noted for pretty nearly the last twenty years, that if you exclude inquests held on children, and accidents in collieries, nearly nine-tenths of the inquests I hold each year are on the bodies of persons whose deaths are to be attributed to drinking."

12. If the poisonous effects of the Alcoholic dose proceed no further than this, the drunkard falls at last into a heavy sleep, from which he awakes to feel the consequences of his transgression. These consequences differ in some degree according to the previous habits. Those unaccustomed to such excesses usually suffer from headache and feverishness, with a dry and furred tongue, total loss of appetite, with a particular loathing for alcoholic drinks, inability for mental or bodily exertion, and depression of spirits; and only recover from this condition, after prolonged repose and abstinence. On the other hand, the man to whom it is habitual, although his general condition is nearly the same, craves for a further dose of his stimulant; and when he has obtained it, he is able to take food, and to proceed with his ordinary avocations.

13. In the *third* and deepest stage of Intoxication, the perverted activity of the brain subsides into a state of complete incapacity for mental action, from which the individual cannot be aroused to consciousness. This state of profound insensibility, being essentially one of *narcotic poisoning*, has been already described as such (§ 4); and we

have seen that, if the torpor spread from the brain to the upper part of the spinal cord, a fatal result is induced, by the suspension of the respiratory movements.

14. From the phenomena of the action of Alcohol on the living body, as presented in cases of alcoholic poisoning, or in the milder form of ordinary intoxication, we are led to conclude that its special action is exerted upon the Nervous System, which it *seeks out*, when circulating in the current of the blood, in virtue of some peculiar affinity which it possesses for that tissue. This we have seen to be proved, not merely by the peculiar disturbance which it occasions in the functions of the nervous system, but also by the results of chemical analysis; and even by the change which it induces in the physical characters of the substance of the brain, with which it thus incorporates itself. A like *selective* power is exerted by other poisons, whose action upon particular organs, or even upon particular parts of the same organ, may be considered as determined by the special affinity which each possesses for the particular tissue it affects.* The selective power of alcohol appears to lead it, in the first instance, to attack the *Cerebrum*, the intellectual powers being affected before any disorder of sensation or motion manifests itself; and to this it seems to be limited, in what has been here described as the *first* stage of intoxication. But with the more complete perversion of the intellectual powers which characterizes the *second* stage, we have also a disturbed function of the *Sensory Ganglia*, upon which the cerebral hemispheres are superposed; this disturbance being indicated by disorders of sensation, and also by the want of adequate control over the muscular movements which require sensation for their guidance. In the *third* stage, the functions of the cerebrum and sensory ganglia appear to be completely suspended; and those of the *Medulla Oblongata* and *Spinal Cord* are now affected, as we see to be indicated not only by the difficulty of respiration, but by the strabismus (squinting), the dilated

* For illustrations of this doctrine, now generally admitted by physiologists, see Dr. W. Budd's paper on Symmetrical Diseases in "Medico-Chirurgical Transactions," vol. xxv.; and Mr. Paget's Lectures on Nutrition, in "Medical Gazette," 1847.

pupil, and the convulsive movements, which occasionally present themselves in this state.

15. The special influence of Alcoholic poison upon the Nervous System is exerted through the medium of the blood, into which it is absorbed; but we have seen that its introduction into the current of the circulation, in any considerable amount, has a very decided effect upon that fluid itself. For, in the first place, it destroys that tendency to spontaneous coagulation, which is the most characteristic mark of the blood's independent vitality, and which serves very important purposes in the economy (§ 1 *c*); and so long as it remains there, it prevents the respiratory process from taking its due share in the purification of the blood from substances which contaminate it (§ 8). In both these modes, it may be fairly presumed that the continual presence of alcohol in the circulating current must impair the nutritive properties of the blood, and must tend to derange the nourishment of the fabric generally, especially affecting that of the nervous tissue, in virtue of its peculiar affinity for that substance. In this manner we should expect that alcohol might act as a *slow poison*, without ever producing those more marked effects with which we have been hitherto occupied. To this subject, on which much light has been recently thrown, we shall next proceed.

16. *Chronic Alcohol-Poisoning.*—Attention has been recently drawn by Dr. Huss, an eminent physician of Stockholm, to a malady of a very peculiar kind, which he has distinctly traced to the direct influence of the continual introduction of Alcohol into the system, and which he has accordingly designated *Alcoholismus chronicus*, or the "Chronic Alcohol-Disease." With this terrible disorder he has been unfortunately rendered too familiar, by the unparalleled and still increasing intemperance of the lower classes of the Swedish population. The following account of the habits of a *moderate* dram-drinker among the working-classes of Stockholm, sufficiently indicates the mode in which the disease is induced

A man of this class rises at five or six in the morning, according to the season of the year, and swallows, before going out, a cup of coffee with a glass of brandy in it. He returns at eight to breakfast, which

meal is washed down with another glass of his favourite spirit. At dinner he repeats the dose of brandy, and often adds another half-glass. About five or six P.M., when his work is finished, another glass is swallowed; and supper at eight is concluded by a similar libation. During the day, therefore, he consumes from 5 to 6 glasses of brandy, or from 10 to 15 ounces of spirit. Such a mode of life is far from being regarded as intemperate; on the contrary, many of the working classes, and especially the iron-porters, regard it as a necessary accompaniment of their laborious occupation. Those who exceed the above-named quantity are by no means looked upon as drunkards; of such men their fellow-workmen would say: "They drink freely, but not more than they can bear." On Saturdays and Sundays more spirits are taken at once, and these men are then often intoxicated. Dr. Huss further states, that many habitual dram-drinkers will consume from 12 to 15 glasses of brandy or other spirit daily; and that he has known some who drank from 16 to 20 glasses, or the enormous quantity of from 40 to 50 ounces of raw spirit daily!

The nature of the malady thus brought on, may be best understood from the following narration of a case in which all its most characteristic symptoms presented themselves:—

"A man, aged about forty, has for the last ten or twelve years been addicted to constant dram-drinking, sometimes to such an extent as to produce intoxication, but more generally without being obviously affected in this manner. For the first six or eight years after giving way to this pernicious custom, his health was in no way impaired; but about four years ago, he had an attack of delirium tremens, from which he has never perfectly recovered. After this disorder had subsided, he returned to his evil courses, and led a life more irregular than heretofore; for, inasmuch as he had formerly continued to take his ordinary meals, he now rarely consumed any solid food, save when he took a morsel or so along with each dram of raw spirits that he swallowed. Dyspeptic symptoms now appeared, and soon after, he remarked that his hands trembled much, especially in the mornings; but subsequently these tremors continued throughout the day, and were increased by exertion, while his bodily powers were much diminished. He found that nothing so effectually overcame this nervous debility, as an additional glass of brandy. He next complained of a peculiar sensation, as if a veil were suddenly passed before his eyes; this occurred chiefly in the morning, though he experienced it likewise during the day, if he strained his eyes by looking fixedly at any object. He now found that his speech was becoming indistinct during the early part of the day, from a peculiar tremulous motion of the tongue. His sleep then became broken by frightful dreams; and often before falling asleep he experienced a 'creeping' sensation beneath the skin of the feet and legs, with spasms and cramps in the gastrocnemii and other muscles. The patient often complained that he felt as if small ants or other insects were making their way beneath the skin. Gradually these

'formications' were felt also during the day, becoming more urgent and painful, and causing an indescribable restlessness, shooting upwards to the back, and then extending to the hands and arms. The tremors now increased in the hands and arms, and he shuffled in his gait, especially when he first attempted to move forwards. The muscular power of the extremities was much diminished, the want of it being most felt when any unusual exertion was required. The knees frequently gave way, and when he attempted to grasp any object, it slipped from between his fingers; gradually the weakness of the limbs became more apparent, and it extended upwards to the muscles of the trunk, so that at length he could neither stand nor sit, but was obliged to remain constantly in the recumbent position. While this was taking place, the sensibility of the skin, hitherto unaltered, began likewise to diminish, first on the points of the fingers and of the toes, and subsequently over the back of the hands and feet, to the forearm and leg. Ultimately, the toes and the legs became insensible, but sensation reappeared below the knee-joint. The same occurred in regard to the fingers and forearm, but less completely, and at a later period of the malady. Along with these symptoms the patient had now more or less of vertigo, sometimes merely to the extent of a sudden and transitory darkness before the eyes, but at other times he would immediately have fallen to the ground if he had not laid hold of some object near him. Hallucinations of various kinds now came on, particularly in the evening, and before falling asleep; and these fantasies often banished sleep altogether. They varied much in character, but often the patient imagined that he saw persons or objects around him, and he occasionally heard voices and laughter. The pupils during this time were dilated and less sensible to light than usual.

"After appropriate treatment, and abstaining from spirituous liquors, his health was in great part restored, and he continued comparatively well, *as long as he observed a regular course of life, and took his ordinary meals.* After a time, however, his resolution failed, he relapsed into his bad habits, and his symptoms speedily returned. The digestive functions were now more affected than on the former occasion; there was frequent vomiting of tough acid mucus, with a sense of weight and distension at the epigastrium after taking food. He became somewhat emaciated, and his skin assumed a dirty-yellowish hue. Soon the formications and muscular debility returned, not alone, but accompanied with painful cramps and startings in the feet and calves of the legs. These startings resembled those produced by electric shocks; at times they were only momentary, but often were more prolonged. Soon they extended to other parts of the body, and became more like convulsions, under the influence of which the patient occasionally became insensible. Gradually these convulsions increased in severity till they formed complete *epileptic seizures*, of daily occurrence, followed often by delirium and hallucinations. Vision now became imperfect: the letters of a book, when the patient attempted to read, seemed to run together into an illegible mass. The powers of thought and of memory were likewise notably diminished.

"Some improvement again took place under medical treatment, but it was only for a short time; and a new symptom now showed itself, in the shape of pains in the legs, which were most severe in the afternoon, but which at times, especially in the morning, entirely ceased. Even when these pains were least severe, the patient still experienced a certain degree of restlessness in the legs, so that he continually moved them up and down in the bed. When the pains were at their height, he described them as if the flesh were burned or cut with knives. The strength daily declined, diarrhœa came on, the skin assumed the appearance of parchment, he became fearfully emaciated, and lay in a condition of low muttering delirium, till death at length closed the scene."

17. To disprove the assertions of those who refused to believe in the unwholesomeness of *good* brandy, and who maintained that all this fearful disturbance of the system is not to be laid to be laid to the account of Alcohol, but to that of some contaminating poison, Dr. Huss performed the following experiments:—

"During eight months, he administered daily, to three dogs of various ages, but of nearly equal size, six ounces of Swedish brandy. To one, the purified brandy was given; but to the other two, the spirit was given unrefined, and consequently in the state in which it is generally consumed by the working-classes in Stockholm. This difference in the quality of the spirit produced no diversity in the symptoms exhibited by the three animals. Intoxication and intense thirst were occasioned by each dose during the first three months; but the dogs continued fat, and apparently well. In the fourth month, the bark of the animals became hoarse; they had a dry cough; the eyes were staring, and full of tears; hearing was much deadened; and the animals' sleep became restless, with frequent jerkings of the limbs. After the completion of the fourth month, the dogs trembled when they attempted to stand, their walks were shuffling, and there was evident weakness of the extremities, especially in the hind legs, so that they often remained in a sitting posture when taking food. Cramps and convulsive movements next appeared in the extremities and in the trunk, both during sleep and when the animals were awake lying on their sides. The sight of other dogs, however, roused them at all times from their apathetic condition, and they endeavoured, even in their weakened state, to attack and bite them. The powers of the animals diminished more and more, as the administration of the alcohol was persevered in; and the sensibility of the skin, especially that of the ears, was remarkably lessened. The appetite now fell off rapidly; but the irritability towards other dogs continued unabated to the last. No diminution of the deposit of fat beneath the skin was observed; it had even rather increased at the period of death, which in all three occurred about the eighth month."

18. This train of symptoms, as is justly remarked by Dr. Huss, bears a close correspondence to that produced by chronic poisoning with arsenic, mercury, lead, copper, or other like substances; but there is this remarkable character about the *Alcoholismus*,—that whilst, in most other forms of chronic poisoning, the disordered state of the system continues for some time after the introduction of the poison into the system has ceased, the effects of alcohol-poisoning speedily diminish and disappear, especially in first attacks, if the patient can be brought to abstain altogether from alcoholic beverages. It is not difficult to see the reason of this; for, in virtue of the peculiar facility with which alcohol undergoes oxidation, it is speedily eliminated from the system when not introduced into it afresh; and until the perverted condition of the nutritive operations has been firmly established by long habit, there is a tendency to return to the normal mode of performing them, so soon as the disturbing cause is removed. The metallic poisons, on the other hand, are often so obstinately retained within the body, that the greatest obstacle to a complete cure lies in the difficulty of effecting their entire expulsion from it. The opinions of Dr. Huss in regard to the effect of the *continual presence* of Alcohol in the circulating current, are precisely in accordance with those already expressed in this work.

"As long as alcohol remains in the blood, a certain degree of poisoning of that fluid takes place, which exhibits itself either by direct intoxication, or, in more gradual doses, by certain disorders of the nervous system. But as the poison in the blood is of a volatile nature, it is decomposed in its passage through the various tissues, and its component parts are separated from each other to form new combinations, or else they are more rapidly carried off by the excretions. It therefore follows, that to produce the symptoms of poisoning, a constant supply of the pernicious fluid should be kept up, so that the blood should always contain more or less of the poison. Now it is precisely in those individuals who pursue this course as dram-drinkers, that the disease is constantly developed; while those who occasionally take spirits to great excess, but at other times abstain altogether, are usually exempt. I have, therefore, throughout this essay always insisted on the necessity of a *constant* use of ardent spirits to produce the nervous symptoms I have described. It is not possible, however, to determine the actual quantity of the poison that must be consumed, ere the disease appears; as this depends on so many extraneous circumstances.'

Many of Dr. Huss's patients informed him, that they had

consumed large quantities of brandy daily, for five, ten, or fifteen years; and of these a considerable number had been only moderate drinkers, before they became what is reckoned intemperate among the labouring classes in Sweden. He believes that persons may become to a certain degree hardened against the effects of alcohol, as against the operation of other poisons; and that this probably renders the malady more slow in its development. Temperament, constitution, and age, are also circumstances which modify very considerably the period of the outbreak of the disease. Many persons, he observes, who have for years daily consumed from twelve to fifteen glasses of brandy, can safely affirm that they have never been thoroughly intoxicated during the whole period; so that it seems proved that *the prolonged and daily use of ardent spirits produces the disease more surely than absolute intoxication*, a fact which has a most important bearing on the general question of the habitual use of Alcoholic liquors.

19. Although Dr. Huss has been the first to give a clear and well-digested description of this disease, of which no fewer than 139 cases have presented themselves at one of the hospitals of Stockholm, between the years 1848 and 1850, yet it probably prevails wherever habitual dram-drinking is practised; and now that the attention of medical observers has been called to its phenomena, it will probably be frequently recognized in this country. The following case is recorded by the English reviewer of Dr. Huss's treatise:

"The patient was a female of the middle classes, and in easy circumstances, who had been for several years, but we could not ascertain how long, an habitual, but secret spirit-drinker. Her medical attendant had been not a little puzzled with the peculiarity of the symptoms. When we first saw this individual, the disease was far advanced. The sleep was much disturbed; there was frequent muttering delirium, but when spoken to she answered correctly; the eyes were red and suffused; the tongue was dry; the pulse was 100 or more; and the appetite was almost entirely gone. The patient had first noticed a difficulty in holding her needle, or in making use of it; and she gradually lost the power of both hands and forearms; subsequently the feet became affected in the same way, commencing at the toes, and here there was well marked loss of sensibility, nearly as far as the knee; above which joint, in both legs, there was intense sensibility of the skin and subjacent tissues, so that

the patient screamed out when the thighs were even lightly touched. There was a good deal of general tremor about this person; but the case was then far advanced, and she died about a fortnight after we saw her."*

20. The foregoing details fully bear out our position, that when such a succession of doses of Alcohol is taken, as keeps the Blood charged with it, notwithstanding its constant withdrawal by the excretory operations, a disordered state of Nutrition is induced in the body in general, but more particularly in the Nervous System, which, if maintained by the continual re-introduction of this substance, at last becomes fatal. It is impossible, then, fairly to refuse to Alcohol, thus taken, the character of a *slow poison;* the injurious effects which it produces being in every respect analogous to those occasioned by the introduction of other substances which are universally recognized as such.

* For a fuller account of the important researches of Dr. Huss, see the review of the first volume of his "Alcoholismus Chronicus," in the "British and Foreign Medico-Chirurgical Review" for January, 1851, and of the second volume in the same review, April, 1852. Many additional facts of importance are contained in Dr. Huss's recent Treatise on the "Endemic Diseases of Sweden," of which an account is given in the same review, October, 1852.

PROPOSITION II.

THE CONSEQUENCES OF THE HABITUAL EXCESSIVE USE OF ALCOHOLIC LIQUORS, AS PROVED BY THE EXPERIENCE OF THE MEDICAL PROFESSION, AND UNIVERSALLY ADMITTED BY MEDICAL WRITERS, ARE PRECISELY SUCH AS THE STUDY OF ITS EFFECTS IN POISONOUS DOSES WOULD LEAD US TO ANTICIPATE; VARIOUS DISEASES BEING THUS INDUCED, IN THE ORGANS WHOSE ACTIONS ARE PECULIARLY LIABLE TO DERANGEMENT FROM THE PRESENCE OF ALCOHOL IN THE SYSTEM.

21. IT may be accepted as a well-established truth in Physiology, that, for the healthful action of any organ whatever, two conditions are essential,—namely, a healthful state of the organ itself, resulting from the due performance of the nutritive operations,—and a healthful condition, and due supply, of blood. A departure from *either* of these conditions will effectually disturb the function to which the organ may be subservient; but the former involves a more lengthened continuance of perverted action, than the latter. Thus, the blood, when temporarily charged with Alcohol, produces a wrong action in the brain, which manifests itself in the phenomena of drunkenness; but these continue only so long as the alcohol remains in the circulation, and pass off with its removal by the excreting processes (§§ 5, 6). But, on the other hand, if the nutrition of the brain itself be disordered by the continual or frequent presence of alcohol in the blood (§ 15), so that its substance is not formed aright, its normal action must remain perverted, until that perversion has been corrected by the formation of new nervous tissue from purified blood.

22. Further, it may be regarded as a well-established truth, that an habitually wrong mode of action induced in a part, by the perversion of the blood, tends of itself to modify its nutrition; for it is a physiological law, that every part *grows to* the mode in which it is ordinarily called upon to *act*. And thus we should be led to expect that, from this cause alone, the consequences of habitual excess in the use of Alcoholic liquors would be likely to manifest themselves sooner or later in disorders of the Nervous System (especially the brain), and in diseases of the Stomach, the

Liver, and the Kidneys; these being the organs whose functional action is most deranged by the occasional presence of alcohol in the blood. It might also be anticipated, that the effects of the alcoholic poison upon the blood itself, would render it no longer fit to maintain the nutrition of the system generally at its proper standard, the condition of its nutritive materials being deteriorated, whilst the excrementitious matters, of which it ought to be thoroughly depurated, are caused to accumulate in the circulating current (§ 7); so that various departures from a healthful condition of the body would be engendered, differing among individuals as to their particular nature, according to the respective predispositions of the several subjects.

23. This is precisely what experience reveals; for there is a certain class of diseases of the Nervous System, of the Stomach, of the Liver, and of the Kidneys, which are so far restricted to individuals who have been in the habit of taking Alcoholic drinks in excessive quantities, that their existence may be taken as an almost certain indication of past intemperance; whilst there is another large class of diseases of all these organs, as well as of disorders of general nutrition, which are so much more frequent among the habitually intemperate, than among the habitually sober, as fully to justify us in regarding the excessive use of alcoholic liquors as among the most efficacious of the conditions of their production.—It will be proper, therefore, to pass the principal diseases of each class in review before us, and to inquire into the mode in which habitual excess in the use of alcoholic drinks tends to produce each of them.

Diseases of the Nervous System.

24. From the peculiar power which Alcohol has been shown to possess, of disturbing the functional activity of the Nervous System, and of perverting its nutrition, it might be expected that disorders of this apparatus would be among the most frequent of the maladies induced by it; and further, that such disorders would show themselves rather in the brain, than in the spinal cord, or in any other part. Such we shall find to be undoubtedly the case. There are, in fact, scarcely any diseases of the Brain, except such as are of a purely constitutional nature, which are not peculiarly

frequent among the habitually intemperate, both in comparison with the occurrence of the same diseases as among the habitually sober, and in proportion to the other diseases of the intemperate themselves. We shall first notice those, which are most directly attributable to alcoholic excesses.

25. *Delirium Ebriosum* (*Drunken Madness.*)—Considering that the state of Intoxication is itself, strictly speaking, a transient paroxysm of Insanity, it can excite no surprise that a confirmed state of mental derangement should frequently result from the repetition of the cause which produces the single paroxysm. There are, in fact, some individuals in whom a fit of positive madness, persisting for some little time after the immediate effects of the stimulus have subsided, is brought on by every excess in drinking; and this is especially the case in warm climates, where the blood, once contaminated with Alcohol, is longer in being purified from it, than where a colder atmosphere is breathed (§§ 108, 110). The head becomes extremely hot, the face flushed, the pulse very frequent, full, and hard, the temper is excessively violent, the individual sometimes attacking every one who comes in his way, and being always prone to ferocity against any one who opposes him; and all sense of danger being lost, he is not deterred from violence by the fear of personal injury, but rushes madly upon what may prove his destruction. This condition, the *Delirium Ebriosum* of Darwin, is obviously an exaggeration of one of the ordinary forms of excitement in common intoxication; and it usually subsides in a day or two, if the individual be simply restrained from doing mischief to himself or to others. The frequent repetition of this paroxysm, of which, as of ordinary drunkenness, the stimulating action of Alcohol on the nervous centres must be regarded as the immediate cause, is almost certain, like the recurrence of regular maniacal paroxysms, to end in some settled form of Insanity.

26. *Delirium Tremens*.—The habitual drunkard who has exhausted his nervous power by continual over-excitement, is liable to another form of disordered action of his brain, which is commonly known from one of its most marked symptoms—the peculiar tremor of the limbs—as *Delirium tremens*. This state is in many respects the opposite of the preceding. There is little or no heat of the head or flush-

ing of the face, the skin is cool and moist, and even chilly; the pulse, though frequent, is small and weak; and the temper, though very irritable, is not violent,—the prominent disposition, indeed, being *anxiety* and *apprehension* of injury or danger. There is an almost entire want of sleep; and even if repose be obtained, it is very imperfect, being interrupted by frightful dreams. On the other hand, the waking state is frequently so disturbed by illusions of a disagreeable or frightful nature, that it differs but little from that of sleep, save in the partial consciousness of external things. The following is the vivid picture of this condition, given by one who has himself experienced it:*—

"For three days I endured more agony than pen could describe, even were it guided by the hand of a Dante. Who can tell the horrors of that horrible malady, aggravated as it is by the almost ever-abiding consciousness that it is self-sought? Hideous faces appeared on the walls, and on the ceiling, and on the floors; foul things crept along the bed-clothes, and glaring eyes peered into mine. I was at one time surrounded by millions of monstrous spiders, who crawled slowly—slowly over every limb; whilst beaded drops of perspiration would start to my brow, and my limbs would shiver until the bed rattled again. Strange lights would dance before my eyes, and then suddenly the very blackness of darkness would appal me by its dense gloom. All at once, whilst gazing at a frightful creation of my distempered mind, I seemed struck with sudden blindness. I knew a candle was burning in the room—but I could not see it. All was so pitchy dark. I lost the sense of feeling too, for I endeavoured to grasp my arm in one hand, but consciousness was gone. I put my hand to my side, my head, but felt nothing, and still I knew my limbs and frame *were* there. And then the scene would change. I was falling—falling swiftly as an arrow far down into some terrible abyss; and so like reality was it, that as I fell I could see the rocky sides of the horrible shaft, where mocking, gibing, mowing, fiend-like forms were perched; and I could feel the air rushing past me, making my hair stream out by the force of the unwholesome blast. Then the paroxysm sometimes ceased for a few moments, and I would sink back on my pallet drenched with perspiration, utterly exhausted, and feeling a dreadful certainty of the renewal of my torments."

27. With this disturbed condition of the brain, a more or less disordered state of the digestive apparatus is commonly associated. The tongue is furred, the stomach unable to bear food without vomiting or a sense of oppression; the bowels are usually constipated, or, if they be relaxed, the

* "Autobiography of J. B. Gough," p. 70.

stools are dark and offensive, and the urine is scanty. Sometimes the disease proceeds to a fatal termination, which is generally preceded by contracted pupil, occasionally strabismus (squinting), incessant low delirium, increase in the muscular tremor almost amounting to subsultus tendinum (twitching of the tendons), and other indications of nervous exhaustion; the pulse becomes thready, and at the same time more rapid, so that it sometimes can scarcely be counted; cold sweats break out upon the skin, and the chilliness of the surface increases, proceeding from the extremities to the trunk. Sometimes a calm supervenes shortly before death; whilst in other instances the patient is carried off in a convulsion. On the other hand, the bad symptoms may gradually abate, and the supervention of profound sleep gives to the exhausted energies of the nervous system the means of restoration. Sometimes, however, the recovery is not complete, but the patient remains in a state of Melancholia, with more or less of deficiency of intellectual power; and this more especially happens after repeated attacks of the disease.

28. Between the *Delirium Ebriosum* and the proper *Delirium Tremens*, there are several intermediate conditions; the former, indeed, being very apt to pass into the latter, if lowering treatment be imprudently adopted. The latter may present itself, like the former, as the direct and immediate consequence of the excessive use of Alcoholic liquors; but there is this important difference,—that while the former is but an exalted manifestation of the primary *excitement* ordinarily produced by alcohol, the latter, supervening at the end of a prolonged debauch, is the consequence of *exhaustion* produced by continued excitement. Delirium Tremens more frequently occurs, however, when the accustomed stimulus is withheld; and it is then no less obviously the result of the previously *exhausted* condition of the nervous system, which nothing save the renewal of the potent stimulus can excite to anything like regular action. In fact, this terrible state is the manifestation of the disordered condition to which the brain has been brought by habitual excess, and too plainly exhibits the complete perversion of its functional power and of its nutritive operations. In fatal cases, no morbid appearances are found, which in the least indicate over-fulness of the vessels or inflammatory

excitement, unless the delirium have partaken of the characters of that which directly arises out of intoxication. And it is manifest, therefore, that the disordered condition must be in the nervous pulp itself, and that it must be of a kind to keep up morbid and irritative activity, at the same time that the tissue is incapable of exercising those reparative functions, which are carried on in the healthy condition during the state of repose.

29. Although, in the vast majority of cases, Delirium Tremens is the immediate or the consecutive result of the excessive use of Alcoholic liquors, yet it *may* occur independently of them; but its other causes are such as resemble the over-excitement of alcohol, in producing *exhaustion* or *depression* of the nervous power,—such, for instance, as excessive depletion, the shock of severe injuries, or extreme cold. But in most of the cases in which one or other of these appears to be its exciting cause, a predisposition has been established by habitual intemperance; and this has been especially remarked of the *Delirium Traumaticum*, or that which is apt to attack persons who are suffering under wounds. It is important to remark, that a slighter form of this disorder, marked by tremors of the hands and feet, deficiency of nervous power, and occasional illusions, will sometimes appear as a consequence of habitual tippling, even without intoxication having been once produced. And a still slighter manifestation of the want of control over the muscular apparatus—the trembling of the hands in the execution of a voluntary movement—is familiar to every one as extremely frequent among the habitually intemperate. We thus see that the disease is at least as much dependent upon the *disordered state of nutrition* which is induced by the habitual presence of alcohol in the blood, as it is upon the positive exhaustion of nervous power resulting from the violence of the excitement which is the more immediate effect of the stimulus.

30. *Insanity.*—Such being the case, we have no difficulty in understanding how the habitual use of Alcoholic liquors in excess becomes one of the most frequent causes of *Insanity*, properly so called, *i. e.*, of settled Mental Derangement. Upon that point all writers on the subject are agreed, however much they may differ in their appreciation of the

relative frequency of this and of other causes. The proportion, in fact, will vary according to the character of the population on which the estimate has been formed; and also according to the mode in which it has been made. For, whilst the supervention of insanity is often distinctly traceable to Alcoholic excesses, some other cause may often perform a more ostensible part. There can be no doubt that those who have weakened and disordered the nutrition of the Brain by habitual intemperance, are far more liable than others to be strongly affected by those other causes, moral or physical, to which mental derangement may be attributed; so that the habit of intemperance has contributed, as a *predisposing* cause, at least as much towards its production, as what is commonly termed the *exciting* cause has done. In fact, of predisposing causes generally, it may be remarked, that their action upon the system is that of slowly and imperceptibly modifying its *nutritive* operations, so as gradually to alter the chemical, physical, and thereby the vital properties of the fabric; and thus to prepare it for being acted on by causes, which, in the healthy condition, produce no influence. And although *that one* of the conditions in previous operation is often singled out as *the cause*, from which the result may seem most directly to proceed, yet it frequently happens that it has really had a far smaller share in the production of the disorder, than those remoter causes whose operation has been more enduring and really more effectual.*

31. In the Statistical Tables, published by the Metropolitan Commissioners of Lunacy, in 1844, comprehending the returns from ninety-eight asylums in England and Wales, we find that out of 12,007 cases whose supposed causes were returned, 1,799, or nearly 15 per cent., are set down to the account of Intemperance; but besides these, 551 or 4·6 per cent. are attributed to Vice and Sensuality, in which excessive use of alcoholic liquors must have shared. Moreover in every case in which Hereditary Predisposition was traceable, *this* was set down as *the* cause; notwithstanding the notorious fact that such predisposition frequently remains dormant until it is called forth by habitual intem-

* See Mr. J. S. Mill's "Elements of Logic," vol. i. p. 398.

perance, and that it is very frequently the result of intemperate habits on the part of the parents (§ 36). Of the 2,526 cases, then, in which the disorder is attributed to hereditary predisposition, a considerable proportion might with equal justice be set down to the account of intemperance. And there can be no doubt that the same practice had a great share in the production of the disease in the 3,187 cases set down to bodily disorder, and in the 2,969 for which moral causes are assigned.

32. If we turn from this general statement to the experience of individual Asylums, we frequently find the proportion much higher. Thus, in the Report of the Edinburgh Asylum for 1852, out of 180 cases of Insanity in which the cause is specified, no fewer than 50 are set down to Intemperance. Curious variations are sometimes observable between the returns for successive years; thus, in the Glasgow Lunatic Asylum, according to the Report of Dr. Hutcheson, the proportions which intemperance bore to other causes during seven years, varied from 13·4 to 25·3 per cent. Of the great increase which showed itself in the years 1845 and 1846, Dr. Hutcheson thus speaks:—"This cause appears to have operated on patients of all ranks; and I am inclined to think that this has been owing, in a great measure, to the excitement in which the community was kept, by that universal spirit of gambling which seized on society like an epidemic mania. There is a great connexion between general excitement and the craving for stimulants, as may be every day seen during contested elections, public dinners, races, &c. It is also a fact well known to those who have minutely studied the subject, that over-exertion of the brain leads to a desire for stimulants, which, however, are easily enough abandoned when the brain is allowed to rest." For the reasons already given, it is probable that the average proportion of 19·7 per cent. does not by any means represent the entire number of cases in which intemperance was the principal cause of the disease; and that we should be within the truth in assigning to it at least *a quarter* of the whole number of cases.

33. In the report of the Aberdeen Lunatic Asylum for 1847, we find Intemperance specified as the cause in 17 cases out of 93 admitted; but of these 93, there were 8 cases in

which hereditary predisposition, and 11 in which predisposition from previous attacks, was assigned as the cause; and there can be no doubt that of these 19 cases a considerable proportion might be set down in part to the account of intemperance. In the report of the Dundee Lunatic Asylum, we find that 8 out of 52 cases admitted are set down to intemperance; 7 were hereditary; and in 4 the cause was unknown. In other Asylums, the proportion of cases returned as due to Intemperance is much greater than in those already referred to. Thus in the Commissioners' report already cited, we find that in nine provincial private asylums, the proportion which the cases assigned to intemperance alone bears to those assigned to other causes, is no less than 32·62 per cent.: independently of 5·67 per cent. which are set down to the account of "Vice and Sensuality." There is an asylum in the east of London, where the proportion of cases attributed to intemperance alone amounted to 41·07 per cent.; and those arising out of this in combination with other vices, to 22 per cent. of the whole number whose causes were assigned. And it is stated by Dr. Macnish (*op. cit.*, p. 193), that of 286 Lunatics at that time in the Richmond Hospital, Dublin, *one half* owed their madness to drinking.

34. *Oinomania.*—There is one form of insanity, which has so peculiar a relation to the use of Alcoholic liquors, as to call for particular consideration in this place; and in order that its characters may be presented in the most unexceptionable manner, the author avails himself of the excellent account of the disease which is given by Dr. Hutcheson in the report of the Glasgow Lunatic Asylum for 1842 (pp. 39–44); deeming its value sufficient to justify him in presenting it without abridgment. The designation *Oinomania*, he would remark, has been substituted by Dr. H. for the less appropriate term *Dipsomania* used by other authors.

"This form of mania," he observes, "is quite different from drunkenness, which, however, may lead to it; the diagnostic mark of the disease being the irresistible propensity to swallow stimulants in enormous doses, whenever and wherever they can be procured. There are individuals who at the festive board invariably become excited, if not intoxicated, but who are otherwise habitually sober, and in the course of the year drink much less than others who never appear to be

under the influence of stimulants. Others indulge in their potations in a regular manner, and daily consume a larger quantity of liquor than is consistent with good health or sobriety. All these, however, possess self-control, and can at any time refrain from stimulants; but those affected with the disease cannot do so, however convinced they may be of the impropriety of yielding to their propensity, or however desirous they may be to subdue it. I repeat, that the disease does not consist in the mere act or habit of becoming intoxicated, but in the irresistible impulse which drives the unhappy being to do that which he knows to be pernicious and wrong, and which in the intervals of his paroxysms, he views with loathing and disgust. He derives no pleasure from taste, for he gulps down the liquor, of whatever kind it may be; or from society, for he generally avoids society; but he only derives a temporary satisfaction from the gratification of his insane impulse, or rather from freeing himself from the overwhelming misery which the non-gratification of his impulse inflicts on him. The disease appears in three forms—the acute, the periodic, and the chronic.

"The *acute* is the rarest of the three. I have seen it occur from hæmorrhage in the puerperal state, in recovery from fevers, from excessive venereal indulgence, and in some forms of dyspepsia. When it proceeds from any of the first three causes, it is easily cured by restoring the health of the patient. When it arises from the fourth cause mentioned, it is not so easily removed, and is very apt to assume the chronic form.

"The *periodic* or paroxysmal form is much more frequent than the acute. This is often observed in individuals who have suffered from injuries of the head, females during pregnancy, at the catamenial periods, on the approach of the critical period and afterwards, and in men whose brains are overworked. When it occurs from injury of the head, the case is hopeless. In the other instances it may be cured. In some cases, it occurs whenever the individual partakes of stimulants. In these, total abstinence is the only remedy. Like the form about to be mentioned, it is frequently hereditary—being derived from a parent predisposed to insanity or addicted to intemperance. In such cases, the probability of cure is very small. The individual thus affected abstains for weeks or months from all stimulants, and frequently loathes them for the same period. But by degrees he becomes uneasy, listless, and depressed, feels incapable of application, and restless, and at last begins to drink till he is intoxicated. He awakes from a restless sleep, seeks again a repetition of the intoxicating dose, and continues the same course for a week or longer. Then a stage of apathy and depression follows, during which he feels a loathing for stimulants, is the prey of remorse, and regrets bitterly his yielding to his malady. This is followed by fresh vigour, diligent application to business, and a determined resolution never again to give away. But, alas! sooner or later the paroxysm recurs, and the same scene is re-enacted, till ultimately, unless the disease be checked, he falls a victim to the physical effects of intemperance,—becomes maniacal, or imbecile, or affected with the form of the disease next to be mentioned.

"Of all the forms of *Oinomania*, the most common is the *chronic*. The causes of this are injuries of the head, diseases of the heart, hereditary predisposition, and intemperance. This is by far the most incurable form of the malady. The patient is incessantly under the most overwhelming desire for stimulants. He will disregard every impediment, sacrifice comfort and reputation, withstand the claims of affection, consign his family to misery and disgrace, and deny himself the common necessaries of life, to gratify his insane propensity. In the morning, morose and fretful, disgusted with himself, and dissatisfied with all around him, weak and tremulous, incapable of any exertion either of mind or body, his first feeling is a desire for stimulants, with every fresh dose of which he recovers a certain degree of vigour, both of body and mind, till he feels comparatively comfortable. A few hours pass without the craving being so strong; but it soon returns, and the patient drinks till intoxication is produced. Then succeed the restless sleep, the suffering, the comparative tranquillity, the excitement, and the state of insensibility; and unless absolutely secluded from all means of gratifying the propensity, the patient continues the same course till he dies, or becomes imbecile. This is that fearful state pourtrayed by Charles Lamb, in which reason revisits the mind only during the transient period of incipient intoxication.

"It must be remarked, that in all these forms of the disease the patient is perfectly incapable of self-control; that he is impelled by an irresistible impulse to gratify his propensity; that while the paroxysm is on him, he is regardless of his health, his life, and all that can make life dear to him; that he is prone to dissipate his property, and easily becomes the prey of the designing; and that in many cases he exhibits a propensity to commit homicide or suicide. He is thus dangerous to himself and others; and however responsible he may have been for bringing the disease on himself, his responsibility ceases as soon as he comes under the influence of the malady. The disease, however, may not be brought on by the act of the individual; and then it is clear at once, that neither directly nor indirectly can he be deemed responsible. But suppose that it were the result of his previous conduct, I repeat that however culpable he may have been for that, he is not a responsible being while afflicted with the malady; for I can see no distinction between this form of the disease, and any other which has been induced by the habits or acts of the individual.

"The only chance of cure or alleviation, is from attention to the health, and abstinence from intoxicating liquors. Neither can be secured so long as the patient is at large; and no amendment can be depended on, unless he has undergone a long course of discipline and probation. Considering, then, that the individual is irresponsible and dangerous to himself and others—that, if left uncontrolled, he will ruin his family—and that his disease can be treated only in an asylum, it is not only merciful to him and his relatives, but necessary for the security of the public, that he be deprived of the liberty which he abuses and perverts, and that he should be prevented from committing crimes instead of being punished, or, I should rather say, being the

object of vindictive infliction after he has perpetrated them. So convinced are some affected with the periodical form of the disease, of the necessity of being controlled, that, when the first symptoms of their paroxysm are felt, they voluntarily enter an asylum, and remain till the attack has passed off. These, however, are men of stronger minds, though, with all their strength, incapable of resisting the disease; and, surely, what they feel to be their only refuge to avoid the impending evil, it cannot be unjust or harsh to force on others whose minds are more impaired. Such cases soon become rational in an asylum; and when the individual can so far control himself as voluntarily to surrender his liberty on the first premonitory symptoms of the malady presenting themselves, he may be dismissed after a shorter probation. It is otherwise with those who have not that self-control, or who fancy that they are unjustly interfered with when checked in their career. They require a much longer probation, which should be increased at each return of their malady.

"Of the chronic form, I have seen only one case completely cured, and that after a seclusion of two years' duration. In general, it is not cured; and no sooner is the patient liberated, than he manifests all the symptoms of his disease. Paradoxical though the statement may appear to be, such individuals are sane only when confined in an asylum."

35. The Superintendent of the Dundee Asylum, in remarking upon the frequent causation of Insanity by Intemperance, makes a very similar statement of the results of his observations; and regrets that there are not in this country such asylums as are understood to exist in the United States, for the reception of those incorrigible drunkards, in whom the power of self-control has been altogether destroyed by their repeated yielding to the craving for alcoholic stimulants.

36. *Mental Debility in the Offspring.*—It is scarcely necessary to accumulate further proof in support of the assertion, that, of all the single causes of Insanity, habitual Intemperance is the most potent, and that it aggravates the operation of other causes. We have now to show that it has a special tendency to produce idiocy, insanity, or mental debility, *in the offspring.* Looking to the decided tendency to hereditary predisposition in the ordinary forms of insanity; looking also to the fact that any perverted or imperfect conditions of the nutritive functions established in the parent, are also liable to manifest themselves in the offspring (as shown in the transmission of gouty and scrofulous constitutions); we should expect to find that the offspring of habitual drunkards would share with those of lunatics in

the predisposition to insanity, and that they would, moreover, be especially prone to intemperate habits. That such is the case, is within the knowledge of all who have enjoyed extensive opportunities of observation; and the fact has come down to us sanctioned by the experience of antiquity. Thus Plutarch says, "One drunkard begets another;" and Aristotle remarks that "drunken women bring forth children like unto themselves." Dr. W. A. F. Browne, the resident Physician of the Crichton Lunatic Asylum at Dumfries, makes the following statements:—"The drunkard not only injures and enfeebles his own nervous system, but entails mental disease upon his family. His daughters are nervous and hysterical; his sons are weak, wayward, eccentric, and sink under the pressure of excitement, of some unforeseen exigency, or of the ordinary calls of duty. At present I have two patients who appear to inherit a tendency to unhealthy action of the brain, from mothers addicted to drinking; and another, an idiot, whose father was a drunkard."* The author has learned from Dr. Hutcheson, that the results of his observations are precisely in accordance with the foregoing. On this point, however, the most striking fact that the writer has met with, is contained in the Report on Idiocy lately made by Dr. Howe to the legislature of Massachusetts. "The habits of the parents of 300 of the idiots were learned; and 145, or nearly *one-half*, are reported as 'known to be habitual drunkards.' Such parents, it is affirmed, give a weak and lax constitution to their children, who are, consequently, 'deficient in bodily and vital energy,' and predisposed by their very organization to have cravings for alcohol stimulants; many of these children are feeble, and live irregularly. Having a lower vitality, they feel the want of some stimulation. If they pursue the course of their fathers, which they have more temptation to follow, and less power to avoid, than the children of the temperate, they add to their hereditary weakness, and increase the tendency to idiocy in their constitution,—and this they leave to their children after them. The parents of case No. 62 were drunkards, and had seven idiotic children."†—There is a prevalent and

* "Moral Statistics of Glasgow," by William Logan, 1849, p. 20.
† "American Journal of Medical Sciences," April, 1849, p. 437.

probably correct impression, that Idiocy is particularly liable to occur in the offspring of a procreation that has taken place when one or both of the parents were in a state of intoxication. A striking example of this kind is related in the "Phrenological Journal" (vol. vii. p. 471); both the parents were healthy and intelligent, and one at least habitually sober; but both were partially intoxicated at the time of the intercourse, and the offspring was completely idiotic.

37. Hence there is every reason to believe, that the monomania of inebriety not only aggravates, and renders more deleterious, whatever latent taint may exist in the individual; but that it vitiates or impairs the sources of health for succeeding generations. That the effects of drunkenness are highly inimical to a permanently healthy state of the brain, is often proved at a great distance of time from the course of intemperance, and long after the adoption of regular habits.

38. *Inflammatory Diseases of the Brain.*—All medical writers agree in regarding Intemperance as one of the conditions which tends to produce *inflammatory* diseases of the brain, now distinguished as *Cerebritis* (inflammation of the substance of the brain), and *Meningitis* (inflammation of the membranous coverings of the brain); and this is precisely what might be anticipated, when it is considered how great must be the derangement of the circulating and nutritive operations, occasioned by the presence of alcohol in the blood. An attack of acute inflammation of the brain not unfrequently supervenes upon a debauch, which is then regarded as its exciting cause. But it may occur quite independently of any special act of excess, in consequence of the predisposition arising from the perversion of the normal functions, by the habitual use of alcoholic liquors in quantities that may never produce actual intoxication. Perhaps, indeed, this is the more common occurrence. We have seen that the state of excitement first produced in most persons by the ingestion of alcohol, would pass into *Meningitis* (or rather inflammation of the *surface* of the brain) if it were not to subside with the elimination of the alcohol from the blood. On the other hand, the state of torpor of the mental functions which alcohol produces from the first in some individuals, and which comes on in all if the intoxication be carried far enough, is indicative of that affection

of the *substance* of the brain, which, if confirmed, and accompanied by a certain disturbance of the nutritive operations, would become *Cerebritis*. There can be no hesitation, therefore, in admitting the relation of cause and effect, in cases in which it is so obviously established by the sequence of the phenomena.

39. There is another class of diseases of the Brain, which are usually dependent upon structural changes that require a longer period for their development, yet whose frequent connection with habitual Intemperance is established both by theory and by observation:—These are Apoplexy, Paralysis, and Epilepsy.

40. *Apoplexy.*—The state of profound Coma, characteristic of the advanced stage of intoxication (§ 13), may be considered to be identical with that of "congestive apoplexy,"* in every respect save the nature of its cause and its duration. Although, as we have already seen (§ 4), the phenomena are so nearly identical, the difference in the cause involves an important difference in the treatment; the comatose drunkard not requiring, nor bearing, the free depletion that is proper in a case of true congestive apoplexy. A certain degree of tendency to apoplexy may be said to exist in the slighter form of intoxication; the vessels of the brain being congested as a consequence of increased action of the heart, and of obstruction to the circulation through the brain, such as is occasioned by imperfect discharge of its functions; and this obstruction being also favoured by that partial stagnation of blood in the lungs, which takes place whenever the respiratory movements are interfered with. This apoplectic tendency seems to render the intoxicated man peculiarly liable to hæmorrhage upon the brain, from causes which would not otherwise produce rupture of the vessels. Thus, there are numerous instances on record, in which blows received in pugilistic encounters, or other comparatively slight injuries, have occasioned fatal hæmorrhage within the cranium; the sufferer having been previously dosed with spirits in such quantity, as of itself to produce a state of congestion bor-

* This term is used to denote that form of Apoplexy in which there is an excessive *congestion* or fulness of the blood-vessels of the brain, without any effusion of blood by rupture of their coats.

dering on apoplexy. And it occasionally happens, though this is comparatively rare, that cerebral hæmorrhage occurs without any external violence, after an excessive indulgence in spirituous potations.

41. But the influence of Alcoholic liquors in the causation of Apoplexy, is usually of a much more gradual nature. It is now generally admitted by Pathologists, that one of the most common sources of Hæmorrhage, whether on the brain or elsewhere, is a gradual alteration in the nutrition of the walls of the blood-vessels, known as *fatty degeneration*, which impairs their firmness, and thus renders them peculiarly liable to burst with a slight pressure. This "fatty degeneration," as will be shown hereafter (§ 71), is specially favoured by the continual use of alcoholic liquors, even in "moderate" quantities; and thus a predisposition to apoplexy is established, which often gives rise to an attack of the disease, when the pressure from within is in any way augmented. Such an augmentation not unfrequently occurs as a consequence of disease of the heart or lungs, which prevents the free return of blood from the brain; but it is also very liable to arise in plethoric subjects, from excessive eating, which, by causing an undue distension of the abdomen, and an abnormal pressure on the outside of its blood-vessels, tends to force an unusual quantity of blood into the vessels of the head, as well as to obstruct its return from them. Hence we find that such cases are rather apt to occur among those who take considerable quantities of wine or malt-liquor with full meals of solid food, than among the drinkers of spirits, who are seldom great eaters. Such an habitual derangement of the circulation may well be supposed to concur with fatty degeneration of their coats, to produce a progressive weakening of the vessels of the brain; and in this manner it happens that after a persistence for months or years in this course, apoplexy may supervene and be its legitimate consequence, without the attack being traceable to any extraordinary indulgence.

42. Of the strength of the general opinion of the Medical Profession, as to the tendency of alcoholic stimulants to produce all such forms of apoplexy, it is impossible to give a stronger proof than the rigidity of the rule of Abstinence which is laid down for those in whom a disposition to any of

them has already manifested itself. Now if it be necessary to lay down such rules to prevent the *re*currence of the disease, is it not most obvious that we are justified in attributing to an habitual violation of them its first *oc*currence? And if habitual excess be so obviously a predisposing cause, can we reasonably deny that the long-continued even "moderate" use of stimulants is likely to exert a slow, but in the end a decided influence?

43. *Paralysis and Epilepsy.*—As the conditions upon which the cerebral forms of *Paralysis* depend, are so nearly the same with those which induce apoplexy, we cannot doubt that the continual intemperate use of alcoholic liquors must predispose to this disease, especially when it accompanies intemperance in eating; and should expect, too, that an attack of it may sometimes be traced to some particular excess, as its exciting cause. All medical writers accord in stating that such is the result of actual observation; and here, again, we find in the rules of treatment laid down, an additional evidence of the general conviction of the tendency of alcoholic liquors, even in small quantities, to induce a recurrence of paralytic attacks. The writer has had opportunities of noticing this, in the case of two gentlemen advanced in life, each of whom suffered from repeated attacks of paralysis, which almost invariably supervened upon a violation of the habitual rule of abstinence from fermented liquors and of extreme moderation in diet.—Precisely the same, too, may be said of *Epilepsy*, the paroxysms of which are among the symptoms of *Alcoholismus* (§ 16), so that there is an evident relation of cause and effect between alcoholic excess and that disordered state of nutrition of the brain, of which the paroxysm is the manifestation. Of this disordered state of nutrition, intemperance in eating and drinking is among the most frequent of the "predisposing" causes, especially when the disease occurs in persons advanced in life; whilst in those who are already predisposed from these or other causes, the excessive use of fermented liquors is frequently the immediate or "exciting" cause of the paroxysm.

44. Besides these positive diseases, a premature exhaustion of nervous power, manifested in the decline of mental vigour and of nervo-muscular energy, are ranked by common

consent among the consequences of habitual excess in the use of Alcoholic liquors; and reasons will be given hereafter for the belief, that it is occasionally the direct, but more frequently the indirect consequence, of the habitual employment of what is considered a very "moderate" allowance.

45. In regard to all these forms of disorder of the Brain, which result from the long-continued action of causes that impair its nutrition, it is to be observed that the habitual use of Alcoholic liquors has,—in addition to its *direct* action upon the functions of circulation and nutrition,—an important *indirect* agency; inasmuch as, by the temporary support it affords, it sustains the nervous apparatus under a degree of exertion that is in the end most injurious to it, and renders the whole system more tolerant of morbific causes of various kinds; the manifestation of whose action, however, is only postponed, and becomes more severe in the end, in proportion to the duration of the agency. This indirect operation of alcoholic liquors, however, will be more fitly considered at a future period (§ 98).

46. *Criminal Conduct.*—To class that Moral Perversion which leads to criminal conduct, among the Diseases of the Nervous System induced by the action of alcohol, may at first sight appear an altogether untenable doctrine; yet a little consideration will show that it is perfectly consistent with what is universally admitted as to the primary effect of alcoholized blood upon the brain. For we have seen that its direct tendency is to weaken the controlling power of the Will, whilst it augments the activity of the automatic or Impulsive part of our nature; and wherever the lower feelings and passions have a constitutional or acquired predominance, they will manifest themselves in the conduct, so soon as, being themselves inflamed, they are left free, by the temporary annihilation of voluntary power, from the restraint under which they may have been previously kept. Now that it is in the state of actual Intoxication, or of the drunken madness which is consequent upon it (§ 25), that a large number of those criminal acts are committed, which render the offenders amenable to punishment, there can be no doubt whatever; and this is true alike of the civic population of our country, and also of its military and naval services in all parts of the globe.

47. But if this be the direct result of the *occasional* action of alcoholized blood upon the brain, it is quite in conformity with the principles already laid down (§§ 21, 22), that the nutrition of the organ should be so perverted by the *habitual* presence of Alcohol (though in comparatively small amount) in the blood which supplies it, as to produce a progressive degradation of the moral tone, by the habitual excitement of the lower propensities, and by the contemporaneous diminution in the power of the will; so that at last, the wretched victim of intemperance is reduced to a state of complete slavery, and no longer has the power, however strong may be his desire, to free himself by a vigorous effort from the chains which have gradually wound themselves around him. His condition, in fact, is essentially one of self-induced Insanity (§ 34); and the entire want of self-control, which shows itself in his repeated indulgence in what he knows to be destructive of his own well-being, leaves him amenable to the tyranny of anger, lust, or any other passion which may have either an original or an acquired predominance in his nature. It is into such a condition that a large number of those offenders have brought themselves, whose outrages against the persons or property of others justly subject them to punishment as criminals.

48. There is a large class of offences, too, which is committed under the influence of the earlier stage of alcoholic excitement, in which the characteristic phenomena of drunkenness may not have manifested themselves, but the temper becomes irascible, so that the individual is easily provoked to acts of violence. How purely *physical* is this result, may be judged from Professor Huss's experiments upon dogs, (§ 17) which were always excited by the sight of others of their kind, and even when in an advanced stage of weakness and apathy, endeavoured to attack and bite them.—The following very characteristic example of this kind was related by Captain Drew to the committee of Naval Officers which lately sat at the Admiralty, to consider the propriety of diminishing the issue of spirits in the navy:

"I had a marine who was a very bad character, and he was constantly complained against for quarrelling and fighting, and disobedience to the orders of his sergeant. At length I began with flogging him; I gave him two dozen lashes, and told him that I would increase his punish-

ment every time I had a complaint against him. In less than a month I had another complaint against him, and I gave him three dozen. Within another month, I had a complaint again, and it appeared to me that the man's reason was affected, as he was constantly excited. I therefore applied to the surgeon of the ship, and asked him to examine him, to see whether he was not a fit subject for invaliding. He was examined, and the surgeon reported that he was as fine and healthy a young man as there was in the ship. I then did not think myself justified in flogging him again, but took upon myself to do an illegal act with a good intention; and when we came into harbour (in the West Indies), I hired a cell in the gaol, and kept him there three days upon bread and water. When the man came out of gaol, I told him whenever I had a complaint against him, as sure as we came into harbour I would send him again to gaol. He said, 'Do you mean to say that I am to be sent to gaol every time we come into harbour?' I said, 'No, only in case of my having a complaint against you.' He said, 'Thank you, Sir.' I said, 'Now, I will start afresh with you. I will forget everything that has happened, if you choose to alter your conduct.' He said that he was very much obliged to me; and he came to me the next day, and asked me if I would stop his allowance of grog, and let him be paid for it. I did so, and never had another complaint against the man while I was in the ship.'

49. Now that, in one or other of these modes, *Intemperance is the chief cause of crime*, is a proposition based upon the evidence of those who have the most extended opportunities of observation,—such as judges, magistrates, gaolers, police-superintendents, missionaries to the poor, and military and naval officers; as will be evident from the following statements, selected from a large mass of a similar kind:

Judge Wightman stated in his address to the grand jury at Liverpool, in August, 1846, that "he found, from a perusal of the depositions, that one unfailing cause of *four-fifths* of these crimes was, as it was in every other calendar, the besetting sin of drunkenness."—Judge Alderson, when addressing the grand jury in 1844, at the York assizes, said: "Another thing he would advert to was, that a great porportion of the crimes to be brought forward for their consideration, arose from the vice of drunkenness alone; indeed, if they took away from the calendar all those cases with which drunkenness has any connection, they would make the large calendar a very small one." —Judge Erskine declared at the Salisbury assizes in 1844, when sentencing a *gentleman* to six months' hard labour, for a crime committed through strong drink, that ninety-nine cases out of every hundred were from the same cause.—Judge Coleridge likewise stated at the

* See the paper entitled "Intemperance the Chief Cause of Crime," in the proceedings of the World's Temperance Convention, held in London, Aug. 4, 1846.

Oxford assizes, "that he never knew a case brought before him that was not directly or indirectly connected with intoxicating liquors."—And Judge Patteson at the Norwich assizes said to the grand jury: "If it were not for this drinking, you and I would have nothing to do."—One of the judges stated some time ago at the circuit-court in Glasgow, that "more than eighty criminals had been tried and sentenced to punishment; and that, with scarcely a single exception, the *whole* of the crimes had been committed under the influence of intoxicating liquors. From the evidence that appeared before him as a judge, it seemed that every evil in Glasgow began and ended in whisky."

So that, according to the testimony of the Judges of our land, whose competency and truthfulness as witnesses no one can call in question, *four-fifths* of the entire amount of crimes is the *very least proportion* we can assign to those which are committed under the direct or indirect influence of intoxicating liquors.—Let us now call witnesses of another, but not less unimpeachable class, the Chaplains of gaols:—

In a late report of the prisons of Glasgow, an account is given of 3907 individuals, most of whom were committed for crimes respecting which sentence of transportation might be awarded; and respecting these the Rev. George Scott, chaplain, thus writes: "Though a number of cases are specified, drunkenness is the most prolific source of most crimes in Glasgow. Of the many thousands annually imprisoned, I think it would not be possible to find one hundred sober criminals in any one year. Even the youngest learn this ruinous vice, and when they live by stealing, swallow astonishing quantities of whisky." The accuracy of Mr. Scott's observations is corroborated by the new chaplain, in his report of Glasgow Prisons for 1845. "To the ruinous habit of drunkenness," says he, "may be traced either directly or indirectly the offences of *at least three-fourths* of those that come to prison, *females* as well as males. Of this I am convinced, even from their own statements, as well as from other circumstances."

The chaplain of the Stirling prison states, "So far as my experience has at present gone, I think that drunkenness is the main cause of crime."—And the Rev. John Clay, the experienced and devoted chaplain of the North Lancashire gaol at Preston, gives similar testimony. "Persons," he says, "who in hard times are led into criminality by destitution, are in better times led into it by drunkenness."

To the same effect is the evidence of Mr. J. Smith, Governor of the Edinburgh prison. The number of commitments for disorderly conduct arising out of drunkenness, during the year ending June, 1844, was 3325; and of those for other offences, the number during the same period was 2385. "I do not hesitate to say," adds Mr. Smith, "that it is my firm belief that, but for drunkenness and the evil and ruinous consequences which follow in its train, there would not have been one-fifth part of the number of commitments during the period."

The following is Mr. Logan's general summary of similar information obtained from other quarters:—"We collected the following information in July, 1844, when visiting prisons in the west and south of Scotland; and the reader will bear in mind that the majority had been committed

for theft, and several were about to be removed to our penal colonies. At Greenock, the governor stated that out of 461 prisoners, 297 might be said to have committed their crimes under the influence of drink. At Kilmarnock, Captain Blane believed that he was under the mark, in stating that *four-fifths* of the crime there was caused by intoxicating liquors. In Dumfries, the governor was 'warranted in stating that nineteen out of every twenty brought before him were so in consequence of drinking;' and when conversing with *thirty* prisoners out of the total number (forty-two) *twenty-nine* acknowledged that strong drink had been the cause of their imprisonment; and the sitting magistrate stated to the clerk of the police court, that very morning, that were it not for intemperance, the premises might be shut up for ever. At Ayr, the governor 'had no hesitation in saying that thirty-nine cases out of forty were the fruits of intemperance,' and added: 'If you think proper to visit the prisoners, you will find that my statement is pretty correct;' we visited each cell, and conversed with every unfortunate inmate; and out of *seventy-three* prisoners there, no less than *seventy* acknowledged that had it not been for these accursed drinking customs, they never would have occupied the lonely cell of a prison. Similar statements were made to us when visiting the prisons of Paisley, Stirling, Hamilton, Dumbarton, Airdrie, and Kirkcudbright; and what is true of Scotland is to a very great extent the same in England and Ireland. . . . . These facts have all been fully corroborated by the testimony of the respective governors of Millbank Penitentiary and Newgate, London; Wakefield House of Correction; Manchester New Bailey; Newgate and the Female Prison, Dublin; and having visited these prisons and conversed with criminals in each of them (with the exception of Millbank, where it is not allowed), we found that their statements respecting the cause of crime were quite in keeping with those referred to in Scotland."

50. It is frequently objected to the conclusions based upon these and similar data, that it is false logic to attribute crime to the intemperate use of Alcoholic liquors; since, even if there had been no such incentive, the ignorance and vicious propensities of a degraded population would of themselves have led to the same results. We are furnished, however, by the statistics of our Military and Naval services, with a class of facts which affords a most decisive refutation of this doctrine. For where we find three sets of men, of the like class, of similar education, and under corresponding conditions,—one set total abstainers, another set temperate, and a third set intemperate,—presenting the strongest possible contrast in their general conduct, no one can reasonably hold back from the admission that there is here a decided relation of cause and effect. Now, the following Table,

representing the comparative rates of punishments awarded to these three classes of men composing the European troops in the Madras Presidency, and published in the "Government Gazette," affords precisely this information; and the result is seen to be most remarkable.

Ratio per Cent. to Strength.

		Teetotalers, 671.	Temperate, 6,611.	Intemperate, 1,461.
Punished by	Regimental Captains .	14 ·754	25 ·003	49 ·555
	Commanding Officers .	8 ·494	31 ·553	101 ·642
Tried by	Regimental Courts Martial	0 ·447	1 ·240	13 ·963
	District do. . .	....	0 ·771	4 928
	General do. . .	....	0 ·151	0 ·889
	Total	23 ·695	58 ·720	170 ·978

The total amount of punishments which it was found necessary to inflict upon the *teetotalers*, was not, in proportion to the number of individuals, so much as *two-fifths* that incurred by the *temperate*, and was *less than one-seventh* of that incurred by the intemperate. Considerably *more than half* of the offences committed by the *teetotalers* were of the most trivial kind, such as could be at once punished by the regimental captains; and nearly the whole remainder were disposed of by the commanding officers; only about *one in fifty* having required even a regimental court-martial, and no district or general court-martial having been called for. Among the *temperate* men, the most trivial offences constituted *less than half*, and those next in magnitude *more than half*, whilst about *one in twenty-eight* was serious enough for a court-martial. Lastly, among the intemperate, the proportion which the most trivial offences bore to the whole, was only a little more than *one-fourth;* that of offences of the next grade was *considerably more than half;* whilst those requiring courts-martial was about *one in nine;*—the proportion of offences requiring regimental courts-martial being nearly as great in proportion to the number of individuals among the intemperate, as is that of the most trivial offences among the teetotalers. The only means of avoiding the inference to which these facts seem necessarily to lead, is by

the assumption that the teetotalers are to be regarded as men naturally possessed of self-control and free from vicious propensities, who are therefore indisposed to criminal actions; whilst the intemperate would all be *mauvais sujets*, even if they had no alcoholic liquors to stimulate their passions, and destroy their power of self-government. But it is obvious that, although this may be true to a certain extent, the difference is too marked, especially as regards that between the temperate and the teetotallers, to be thus explained away; and besides, it is a notorious fact, that a large proportion of the teetotallers are reclaimed drunkards, who, if the restraint of their pledge were removed, would rush into the wildest excesses.

51. A still more conclusive proof, however, is afforded by cases in which the conduct of the same populations or bodies of men may be compared, when on the two different systems, —the abstinence system not being voluntarily adopted, but forced upon them. Thus, the introduction of a law into the State of Maine (New England), prohibiting the manufacture and sale of Alcoholic liquors, except under certain stringent regulations, has almost entirely done away with the opportunities of indulgence in the use of intoxicating drinks; and the result has been a most marked diminution in the number of offences, both against the person and against property.—The following is a yet stronger case. It was the concurrent opinion of *all* the witnesses of various grades in the Naval service, who were examined before the Admiralty Committee of which mention has already been made, that a state of either actual intoxication, or of irritability arising out of half-drunkenness, is the immediate cause of from *three-fourths* to *nine-tenths* of the punishments which it is found necessary to inflict on board a ship of war; and this opinion, based upon common observation, was found to be justified, not merely by the examination of the lists of offences, but by experiments made for the purpose of testing it. The decision of the Committee, to recommend that the allowance of spirits should be reduced one-half, and that it should be issued only once instead of twice in the day, was perhaps the most *practicable* measure that could be devised under the circumstances; and this has already worked a most important change. For the author has learned, on

most excellent authority, that the Admiral of the Mediterranean fleet has stated that a diminution in the number of punishments has taken place, since this recommendation has been carried into effect, to an extent of from 70 to 80 per cent.; that is, the number of punishments is not now more than 20 or 30 per cent. of what it formerly was. Such a reduction is what the most sanguine advocates of the Total Abstinence principle would not have ventured to predict from the incomplete measure which has been adopted; and it most fully bears out the oft-repeated but oft-disputed statement, that *intemperance is the chief cause of crime.**

DISEASES OF THE ALIMENTARY CANAL.

52. The disorders of the nervous system, whose symptoms are among the most obvious and characteristic results of alcoholic intoxication, having been now considered, we proceed to examine the influence of Alcoholic liquors on the production of diseases of the Digestive Apparatus. This influence is exerted in two ways: first, by the direct irritating action of the fluid upon the mucous lining of the alimentary canal; and second, by the general deterioration of the nutritive processes, resulting in various ways from the entrance of alcohol into the blood.

53. *Irritation and Inflammation of the Mucous Membrane of the Stomach.* That irritation would be produced in the very vascular mucous membrane of the stomach, by the direct contact of alcoholic liquors, and that this would vary in its intensity with the amount, concentration, and duration of the application of the irritant, is precisely what we should anticipate, from what has been already stated as to the effects of poisonous doses. A small quantity of alcoholic liquor, diluted by the fluids already in the stomach, appears

* A very curious fact has been ascertained by Mr. Neison, which seems to afford a strong confirmation of this conclusion; namely, that the proportion of crime in the two sexes is almost precisely the same as that of intemperance—as measured by the number of deaths from that cause. For whilst the ratio of convicted criminals of the male sex is to that of the female as 1581 to 336, or as 100 to 21·25, the ratio of deaths from intemperance at the age of 20 and upwards is 36,769 in the male to 8011 in the female, or as 100 to 21·78—an accordance which can scarcely be accidental.

to produce only a quickening of the circulation, and a temporary exaltation of the functional activity of the organ, as shown in the increase of appetite and of digestive power. But when a larger quantity is introduced, and especially when successive doses are taken, so as to keep up the irritation, or when the alcohol is in a state of high concentration, and the stomach contains but little other fluid, all the effects of an irritant are produced, varying from moderate congestion with diminished functional activity, to intense congestion passing into inflammation, and even to a gangrenous state. The more severe effects, however, are not often seen; in consequence, it may be surmised, of the rapidity with which the alcohol has been absorbed (§ 1, *a*), and the brevity of the duration of its contact with the membrane, shielded as this is with its coat of mucus. Hence a *repetition* of the dose seems more likely to produce a state of high irritation, or of inflammation, than any single dose, unless this have been too great to be quickly absorbed.

54. The morbid appearances found in the stomachs of men or animals killed by the alcoholic poison in its narcotic form (§ 4), and attributable at first sight to the direct influence of the irritant, can seldom be fairly regarded in that light; since they are for the most part attributable to the asphyxia which has been the immediate cause of death, similar appearances being found when death has taken place from suffocation in other modes—*e. g.*, in criminals executed by hanging. In the case of animals poisoned by alcohol, it frequently happens that scarcely any positively morbid appearances are discernible in the stomach; and the departures from the healthy character which are noticed in the stomach of the Human subject, after death from alcoholic poisoning, are most frequently such as indicate an altered state of its nutrition, consequent upon habitual irritation. Of these departures, a *thickened* state of the mucous membrane seems to be the most constant; the membrane being sometimes softened (as stated by Dr. Ogston); sometimes unusually firm, corrugated, and pale (as observed by Dr. Peters). These last appearances seem to have been most common when a quantity of undiluted spirits had been taken shortly before death, and very probably result from

that *physical* action exerted by them upon the membrane, which results from the difference in the capillary attraction of the tissue for alcohol and for water respectively.

If animal membranes, a mass of flesh, or coagulated fibrin, be placed in alcohol in a fresh state (in which they are thoroughly charged with water), there are formed, at all points where water and alcohol meet, mixtures of the two; and as the animal texture absorbs much less of an alcoholic mixture than of pure water, a larger amount of water is of course expelled, than of alcohol taken up; and the first result is a shrinking of the animal substance. "Thus," says Professor Liebig, "9·17 grammes of bladder, fresh, that is, saturated with water (in which are contained 6·95 grammes of water and 2·22 of dry substance), when placed in 40 cubic centimetres of alcohol, weigh at the end of 24 hours 4·73 grammes, and have consequently lost 4·44 grammes. For *one* volume of alcohol, therefore, retained by the bladder, rather more than *three* volumes of water have been expelled from it."

This corrugating effect of alcohol will be usually increased by the coagulating influence which it will exert on whatever soluble albumen the tissues may contain. Both these results will, of course, be proportioned in their degree to the state of concentration of the alcohol.

55. We have seen, however, that after the primary narcotic effects of the alcohol have passed off, another set of symptoms may appear, indicative of inflammation of the alimentary canal (§ 1 *d*, 2 *c*); and if these proceed to a fatal termination (as now and then occurs), the usual appearances indicative of that state are found in the gastro-intestinal mucous membrane. In one example of this kind, cited by Dr. Christison, the whole lining membrane of the stomach was in a gangrenous state, the colon was much inflamed, and the small intestines red along their whole length.

56. Our best information as to the effect of alcoholic liquors upon the condition of the gastric mucous membrane during life, is derived from the well-known observations of Dr. Beaumont in the case of Alexis St. Martin. This man appears to have been habitually temperate and healthy; but to have occasionally indulged in excess both in eating and drinking, the results of which could be seen by direct observation through the opening in the walls of his stomach by the imperfect healing of the wound which had laid it open.

Thus, says Dr. Beaumont, under the date July 28th, 1833,—"Stomach not healthy, some erythema, and aphthous patches on the mucous surface. St. Martin has been drinking ardent spirits pretty freely, for eight or ten days past,—complains of no pain, nor shows symptoms of general indisposition,—says he feels well, and has a good appetite. August 1st,—Inner membrane of the stomach morbid; considerable erythema, and some aphthous patches on the exposed surface; secretions vitiated. August 3rd,—Inner membrane of stomach unusually morbid; the erythematous appearance more extensive, and spots more livid than usual, from the surface of which exuded small drops of grumous blood; the aphthous patches larger and more numerous; the mucous covering thicker than common, and the secretions much more vitiated. The gastric fluids extracted this morning were mixed with a large proportion of thick, ropy mucus, and considerable muco-purulent matter, slightly tinged with blood, resembling the discharge from the bowels in some cases of chronic dysentery."

Now, it is very important to remark, that all this disorder was proved by direct observation to be actually existing in the mucous coat of the stomach, without any such manifestation of it by general or local symptoms, as would by themselves have been thought indicative of its presence.

"For," continues Dr. Beaumont, "St. Martin complains of no symptoms indicating any general derangement of the system, except an uneasy sensation, and a tenderness at the pit of the stomach, and some vertigo, with dimness and yellowness of vision on stooping down and rising again; has a thin yellowish brown coat on his tongue, and his countenance rather sallow; pulse uniform and regular, appetite good, rests quietly, and sleeps as well as usual." By the 6th of August, the inner surface of the stomach had recovered its healthy appearance; the patient having in the meantime entirely abstained from all alcoholic liquors, and having been confined to low diet.

Dr. Beaumont further states, that "diseased appearances similar to those mentioned above, have frequently presented themselves in the course of my experience and observations. They have generally, but not always, succeeded to some appreciable cause. Improper indulgence in eating and drinking has been the most common precursor of these diseased conditions of the stomach. *The free use of ardent spirits, wine, beer, or any intoxicating liquors, when continued for some days, has invariably produced these morbid changes.*"

57. From the precise concurrence of these observations with what theory would lead us to expect, in regard to the action of alcoholic liquors on the mucous membrane of the stomach, it is obvious that we have no right to suppose that

the peculiar condition of St. Martin gave him any peculiar liability to suffer in the manner above described. On the contrary, such disorders of the circulation, nutrition, and secretion, might be anticipated to occur in every case; and it is only because they are not immediately indicated by pain and heat in the stomach, by loss of appetite, or by general febrile disturbance, that they are presumed not to exist. This presumption, however, has been shown to be altogether fallacious; and we have adequate reason to believe that some such condition must be the result of *every excess* in the use of alcoholic liquors, however little it may be indicated by the local or general symptoms.

58. *Inflammatory Gastric Dyspepsia.*—It might be anticipated, then, that habitual excess would convert this state of occasional and transient disorder, which only requires rest and abstinence for its cure, into one of a more persistent and obstinate character, which, by unfitting the stomach for the discharge of its normal functions, would seriously impair the general nutritive operations. Such has been shown by experience to be the case; a special form of dyspeptic disorder termed *Inflammatory Gastric Dyspepsia*, being well known to practical men as common among those who have freely indulged in alcoholic potations. Of this disorder the following are the symptoms, as enumerated by Dr. Todd:*

"Painful digestion, sense of heat, tenderness, or pain at the epigastrium, increased upon taking food or on pressure; thirst; tongue more or less of a bright red colour, sometimes brownish red, sometimes dry, glossy, and adhesive; taste saltish or alkaline, occasional y like that of blood; bowels generally confined; urine high-coloured; skin dry, with occasionally profuse partial sweats, chiefly in the direction cf the extensor muscles; temperature of the trunk increased, of the extremities diminished, except occasionally in the palms of the hands and soles of the feet, which, especially at night, are frequently hot, dry, and burning; aggravation of the symptoms under the use of stimulants or of irritating ingesta."

The various stages and degrees of the disease are characterized by various modifications of these symptoms, many of them the consequences of the disturbance of the nutritive functions produced by the disorder of the stomach; but of all such consequences it may be remarked, that they

* "Cyclopædia of Practical Medicine," Art. *Indigestion.*

are probably aggravated by the previous disturbance of the nutritive and secretory operations, consequent upon the habitual introduction of alcohol into the blood. Thus we find a special tendency to certain kinds of cutaneous eruptions; to sluggish and imperfect action of the liver; to scantiness in the secretion of the kidneys; and to depression of spirits, with inability for active mental exertion, passing on, in the more confirmed states, to complete hypochondriasis. Although excess in eating may aid in the production of this wretched condition, yet, as Dr. Todd remarks, it is rather due to the stimulating quality of what is taken into the stomach, than to its quantity; and although it may occasionally arise from the habitual use of highly-seasoned food without the proper dilution by bland liquids, yet it is much more frequently brought on by indulgence in alcoholic potations; "it is the dyspepsia of the dram-drinker and opium-eater, and belongs altogether more to the drunkard than the glutton." In the treatment of this disease, the complete disuse of stimulants is found to be of the greatest importance; notwithstanding that, in the more chronic forms of it, a temporary alleviation is sometimes obtained from small quantities of alcoholic liquors.*

59. *Disorders of the Intestinal Mucous Membrane.*—The disordered state of the mucous membrane of the alimentary canal, is not limited, as we have seen, to the stomach; it may extend itself along the whole course of the intestinal tube, to parts with which the alcoholic liquors themselves have not come in contact, so as to be attributable rather to the general imperfection of the nutritive operations, than to the local effects of the stimulant. Thus, we find that habitually-intemperate persons are subject to soreness, redness, and ulceration of the membrane of the nose, and of that of the lower part of the intestinal canal; and *hæmorrhages* from various parts of this membrane, as well as from the mouth itself, are of no unfrequent occurrence; the escape of blood being obviously dependent in part on its own insufficient plasticity, and in part upon the softened condition of the walls of the vessels. It is important to bear this in mind, as increasing the probability of the same cause being

* See the observations of Sir Philip Crampton on this subject, in "Dublin Hospital Reports," vol. i., p. 349.

concerned in the production of a similar softening elsewhere; as, for example, in the vessels of the brain.—(See § 41.)

Diseases of the Liver.

60. That habitual excess in the use of Alcoholic liquors must have a direct tendency to produce certain diseases of the Liver, will be questioned by no one who considers their mode of introduction into the system, and their influence on the condition of the blood. The blood which returns from the veins of the stomach charged with alcohol, is immediately transmitted through the liver; and it stimulates this gland for a time to increased activity, one effect of which is to eliminate a portion of the alcohol from the blood,—this substance, according to Dr. Percy's observations, being detectible in the bile of animals poisoned by alcohol. Hence the liver, like the stomach, is subject to habitual over-stimulation from the direct contact of alcohol with its substance. But we have seen that the presence of alcohol in the blood prevents it from acquiring its proper arterial character by passage through the lungs; and we shall hereafter find that it causes the undue retention in it of hydro-carbonaceous matters, which ought to be removed by the respiratory process (§ 71). Hence an undue amount of labour is thrown upon the liver,—one of the functions of this gland being, to separate from the blood such hydro-carbonaceous matters as are not carried off by the respiratory organs; and this continual overwork must predispose it to various disorders, especially in tropical climates, where the respiratory function is carried-on at a diminished rate.

61. *Congestion of the Liver.*—This disorder, which consists in a gorged state of the blood-vessels of the organ, is one of the commonest results of habitual excess in the use of Alcoholic liquors, especially when this is accompanied with excess in eating. Hence it is most liable to occur in persons of indolent and sedentary habits, who indulge much in the pleasures of the table; but it frequently presents itself also in those who consume inordinate quantities of gin and porter, notwithstanding that the ill-effects of their potations may be to a certain extent kept off by the active respiration which is promoted by a life of labour. Though this state of

congestion occasions a great enlargement of the organ, it is accompanied by a diminution in the secretion of bile, which may give rise to jaundice and various other derangements of the general health. Moreover, any obstruction to the passage of blood through the liver must extend itself, in proportion to its amount, to the blood-vessels of the stomach and the intestines; since their venous current has no other means of passing back to the heart, than by the portal vein, which distributes it through the substance of this organ. This stagnation and undue distention of the vessels of the alimentary canal, in its turn, gives rise to various derangements of its functions, which aggravate those produced by the more direct agency of Alcoholic liquors.

62. *Acute and Chronic Inflammation of the Liver.*—In tropical climates, *acute inflammatory diseases* of the liver are among the most common of all disorders; and they are distinctly traceable, in a large proportion of cases, to that excess both in eating and drinking, to which Europeans are unfortunately but too prone; being rare among the natives, and almost equally rare among the Europeans who adopt the native manner of living. In this country, acute inflammation leading to abscess is comparatively rare; but there is a form, termed by Dr. G. Budd,* "Adhesive Inflammation of the Liver," which leads to further changes in its substance, in consequence of the obstruction it causes to its nutrition, by the partial or complete obliteration of some of the branches of the portal vein which brings its chief supply of blood. This disease is distinctly traceable in a great majority of instances, to the irritation produced in the lining membrane of the walls of these blood-vessels, by the presence of alcohol in the circulating current; for it is almost exclusively restricted to spirit-drinkers, from whose stomachs the alcoholized blood is conveyed through the liver (by the termination of the gastric veins in the portal system), before it mingles with the general mass of the circulating fluid. It is probably more common in its chronic, than in its acute form; but the ulterior consequences will be the same in either case. The circumstances which have been observed to favour the occurrence of inflammatory diseases of the

* See his "Treatise on Diseases of the Liver," chap. iii., sect. 3.

liver,—such as habitual exposure to a high temperature, and diseases of the heart or lungs occasioning an obstructed circulation through them,—obviously act by opposing the elimination of the alchol by the respiratory process, and thus prolonging its injurious influence on the liver.

63. The blocking-up of some of the vessels of the portal system gives rise to *atrophy* (or imperfect nutrition) of the proper substance of the liver; and this is further favoured by the gradual contraction of a new fibrous tissue (or false membrane), which is formed by the consolidation of the fib-ous lymph effused during the inflammatory process. This may interpenetrate the whole substance of the liver, forming thin lines between small irregular masses of its lobules; and at the parts of the surface which correspond to these lines, the enveloping capsule is drawn-in, so that the surface presents the appearance which is designated "hob-nailed." The texture of the liver is paler than natural, from the presence of this white fibrous tissue, and from its containing but a small quantity of blood; it is often made yellowish by the accumulation of biliary matter in its component cells; and when such is the case, a section of the liver presents the greyish-yellow colour of impure bees'-wax, whence the change thus induced has been designated *cirrhosis* by French pathologists. The liver thus altered is usually much reduced in size, being sometimes contracted to no more than half its usual dimensions; and as no small part of the organ is composed of adventitious tissue, its proper substance is yet more reduced in proportional amount.—So general is the recognition of the dependence of this condition of the liver, on the habitual intemperate use of alcoholic liquors, that the organ thus shrunk and puckered, is commonly known by the designation of "gin-liver."

64. This, however, is not the only change induced by alcoholic excesses; for they not unfrequently give rise to an *enlargement* of the liver, which is due, however, not to an increased growth of its proper substance, but to an accumulation of fatty matter. Such has been particularly met with in the experience of Dr. Peters, of New York, who gives the following account of the condition of the liver in seventy cases which he had an opportunity of examining:— "In 'moderate drinkers,' the liver was generally found to be

somewhat larger than usual, its texture softened, and its outer surface spotted with patches of fatty infiltration, extending two or three lines into the parenchymatous substance; the rest of the viscus retaining its natural colour, and its edges their normal sharpness. In those who had been more addicted to the use of spirits, the liver was still larger, its edges were more obtuse, and the patches of fat on its surface were larger and more numerous. In old drunkards the liver was very large, weighing at least six or eight pounds, often from ten to twelve; the edges were very thick and much rounded: the parenchyma almost white with fat, soft, fragile, and the peritoneal covering could be torn off with ease."—It is evident that in all these cases, the liver was the subject of various degrees of *fatty degeneration*, which takes place, on the one hand, as the result of the deficient functional activity of the gland, whilst on the other it is indicative of an excess of fatty matter in the system (§ 71). The peculiar conditions of the liver known as "granular liver," and "hob-nailed liver," or "gin-liver," were comparatively rare in Dr. Peters's experience, being observed only in four or five cases; but they seem to be much more common in this country; and its greater prevalence may possibly be due to a difference in the character of the spirit usually employed by drinkers among the lower classes, *gin* being here the most common, *rum* and *brandy* in the United States.

Diseases of the Kidneys.

65. A special determination of blood to the Kidneys takes place as one of the results of the reception of Alcoholic liquors into the blood; and these organs are thereby excited to augmented action, one of the purposes of which would seem to be the removal of the alcohol from the current of the circulation (§ 5). But as the blood of the kidneys is derived from the arterial system, in which the alcohol becomes diluted by the whole mass of sanguineous fluid, it might be expected that excess in Alcoholic liquors would not have the same tendency to produce *acute* inflammatory attacks in these organs as in the liver; although it might act as the exciting cause of such attacks, when the predisposition has been established by other agencies. This anti-

cipation is entirely borne out by medical experience. But further, we should expect that the habitual use of alcoholic liquors in excess, would have a special tendency to produce a state of *chronic irritation*, passing into chronic inflammation; with various consequent alterations in the structure, and deterioration in the function, of the Kidneys. This also is entirely conformable to well-ascertained facts; for the intemperate use of alcoholic liquors is recognized by all writers on diseases of the kidneys, as among the most potent and frequent causes of chronic disorders of these organs; it being peculiarly concerned in the production of that morbid condition which is commonly known as *Bright's Disease*, or *granular degeneration* of the kidneys. This is now generally considered as a result of chronic inflammation and atrophy of the proper tissue of the kidney, with deposits of fatty, albuminous, or other unorganizable matters in its substance,—a state, in fact, very closely resembling the degenerated conditions of the liver already described. Now, of this disease, Dr. Christison states that from three-fourths to four-fifths of the cases which he met with in Edinburgh, were in persons who were habitual drunkards, or who, without deserving this appellation, were in the constant habit of using ardent spirits several times in the course of the day; and the experience of English hospital practice is (so far as the writer has been able to ascertain) precisely similar. The disease, on the other hand, is very rarely met with among those who are not given to excessive spirituous potations. Here, too, it would seem as if the use of malt spirit (gin or whiskey) gives a greater predisposition to the disease, than that of rum or brandy; the former having a more diuretic effect than the latter—that is, producing a greater temporary activity in the kidneys, and having a greater tendency to bring about a state of chronic irritation.

66. But we are not to suppose that, if this severe form of renal disease be not developed, the Kidneys escape altogether free. We should expect that the consequences of long-continued and habitual excitement would manifest themselves in subsequent impairment of functional power, even if no obvious structural disease be engendered; and there can be little doubt that such is the case, since we find that persons advanced in life, who have habitually indulged

freely, even if not excessively, in alcoholic liquors, are extremely apt to suffer from *Gout*, *Rheumatism*, and other disorders, which mainly depend upon the insufficient elimination of such morbid matters from the blood, as ought to be carried forth through this channel (§ 75). Excesses in diet, which at an early period of life are counteracted by the activity of the excretory apparatus, are no longer thus kept in check, when the kidneys begin to fail in the performance of their duty; and although we may not be able with positive certainty to attribute this failure to free indulgence in Alcoholic liquors, yet it cannot be reasonably questioned that such habits must tend to produce it, since we find that over-excitement of *any* organ is regularly followed, sooner or later, by depression of its functional power, and we have seen that the continual stimulation of the kidney by alcohol has a special tendency to produce perverted nutrition, and thus to render the organ unfit for the performance of its duties.

Diseases of the Skin.

67. The determination of blood to the Skin, which has been noticed as one of the results of the ingestion of Alcoholic liquors, has a tendency, when frequently repeated, to produce various disorders in *its* nutrition, chiefly those resulting from congestion or inflammation of its several tissues. Such disorders show themselves especially in the skin of the face, and this for two reasons; in the first place, because the face partakes in the general determination of blood towards the head, so that it becomes more flushed than any other part of the surface; and also because the exposure of this part of the cutaneous surface disposes it to be more affected than that of the body and limbs by external cold, which will always tend, by lowering the vital activity of any tissue, to increase the evils resulting from too copious a determination of blood towards it. Hence we find the skin of the face especially disposed to exhibit those carbuncles, boils, &c., which may be considered, in a large proportion of cases, as the direct result of habitual intemperance; it is also the part in which the erysipelatous attacks, so common among the intemperate, most frequently commence, when they are not immediately excited by some

injury elsewhere; and it is on the face, too, that we most frequently meet with various forms of Acne, of which the *Acne rosacea* is, in a very large proportion of cases, directly attributable to intemperate habits. Certain other diseases of the skin (as already noticed, § 58) seem to be rather consequent upon the disorder of the digestive apparatus induced by the habitual free use of alcoholic liquors, than due to the direct agency of the alcohol upon its tissue. There is a disease, however, noticed by Dr. Darwin, under the name of *Psora Ebriorum* (Drunkards' Itch), which may be fairly attributed to a chronic though slight perversion of the nutritive operations of the skin, in consequence of the presence of alcohol in the blood. Of this disease Dr. Darwin says: "Elderly people who have been much addicted to spirituous drinks, as beer, wine, or alcohol, are liable to an eruption all over their bodies, which is attended with very afflicting itching, and which they probably propagate from one part of their bodies to another with their own nails, by scratching themselves." Dr. Macnish states that he has himself seen many cases of this disease.*—Most other Cutaneous disorders, which are less directly traceable to intemperate habits, are greatly aggravated by them; so that strict abstinence from fermented liquors is an almost invariable rule in the treatment of them, unless the use of these in small quantities be thought requisite to improve the state of the digestive function.

General Disorders of Nutrition.

68. Having thus considered the principal forms of disease, which the intemperate employment of Alcoholic liquors has a tendency to induce in the several parts of the Excretory apparatus, we have now to consider those general disorders of nutrition, which are traceable to the same cause, and which manifest themselves either as substantive diseases, as modifying the course of other diseases, or as giving a special liability to the action of other morbific causes. We have already spoken of the deteriorating effect of the admixture of alcohol with the Blood; how it impairs the coagulability of the fibrin, and impedes the process of aëration, thereby

* "Anatomy of Drunkenness," p. 178.

preventing the combustion of the "waste" of the body, which ought to find its vent through the lungs. Another less direct but not less important source of deterioration, is to be found in the imperfect elimination of the constituents of the bile and urine, which must be the consequence of functional inactivity, still more of structural degeneration, of the liver and kidneys. Hence it would seem impossible that by such a *pabulum* the formation of the solid tissues can be normally sustained; and we should expect to find that the nutritive processes are not performed with the same energy and completeness in the habitually intemperate, that they are in the habitually abstinent. Notwithstanding some appearances to the contrary, there is abundant evidence that such is the case. Although a high degree of bodily vigour seems to be exhibited by certain classes of men, who consume large quantities of fermented liquors, yet this is deceptive, as the facts to be presently stated (§ 72) will clearly indicate; and the general result is evidently on the other side.

69. *Tendency to the Deposition of Fat.*—The immediate effects of Alcoholic liquors upon the general appearance of the body, especially as regards the deposition of fat, vary with their nature, and with the circumstances under which they are habitually used. Thus it is generally to be noticed that those who indulge largely in malt liquors become fat, and often exceedingly corpulent; the large consumers of wine commonly share the same tendency; but the spirit-drinker is more commonly lean and even emaciated. This difference may partly depend upon the constitution of the liquors. Ale, beer, &c., contain a considerable amount of saccharine matter, which is either consumed in respiration, leaving the fatty matters of the blood to be deposited as fat, or is itself converted into fat; in wine, again, there is more or less of solid matter, which furnishes materials for combustion; whilst in distilled spirits, there is scarcely anything save alcohol. But it also depends in great part upon the amount of solid food habitually taken with the drink; thus the beer-drinker, if he be leading a life of great muscular exertion, may find his appetite but little impaired by his excess; the wine-drinker also usually feeds high; whilst the spirit-drinker, especially among the poorer

classes, takes his dram *instead of* solid food, for which he has neither appetite nor pecuniary means. The corpulence of the beer and wine-drinker, however, seldom continues to old age; and the parts which first begin to shrink are the legs, after which the shoulders generally give way, and the whole body becomes loose, flabby, and inelastic, the abdomen alone retaining its protuberance, in consequence of the large deposition of fat in the omentum, which is rarely absorbed. Such a deposition of fat is almost invariably found in the omentum of confirmed spirit-drinkers,* notwithstanding its absence elsewhere; or it may occur in the walls of the abdomen, as in the following case, recorded by Dr. Robertson.†

The subject of this case was a very young man, who died early from the intemperate use of spirits. For several months before his death, he had been unable to eat more than a very small quantity of food, and his powers were almost exclusively maintained by frequent dram-drinking. The immediate cause of death was softening of the brain, a disease of mal-nutrition; but although the body was much attenuated, the muscular fibre of the system much wasted, and the sub-cutaneous fat of the extremities had almost disappeared, in cutting through the abdominal walls to examine the condition of the liver, at least three times the usual thickness of fat had to be divided.

70. A general corpulence of the body, however, can by no means be admitted as an indication of healthy nutrition; indeed it must be regarded as very much the reverse. No animal in a state of nature exhibits any considerable deposit of fat, except for some special purpose (as in the case of cetacea and other warm-blooded animals inhabiting the water, where the coating of fat serves as a non-conductor; or in the case of hybernating mammals, as also of many birds, whose autumnal accumulation of fat is destined to make up for the deprivation or deficiency of food in the winter): and when by a change of habits the deposition of fat is artificially promoted, it is obvious that the muscular vigour and general "hardiness" of the system are much impaired, the animal becoming liable to many disorders from which it was previously exempt, and requiring much more careful treatment to keep it in good condition.

* Dr. Peters, loc. cit.

† "Treatise on Diet," 4th edition, vol. i., p. 272.

71. When, indeed, we find a tendency to the deposition of fat, not in *addition to*, but *instead of*, the normal tissues, the case is one of "fatty degeneration," and must be regarded as a positive disease,—involving, as it does, a general functional inactivity. To this change much attention has been of late years directed by scientific pathologists; and it is now recognized as the direct cause of numerous disorders of the most serious kind. When a fatty deposit is substituted for the normal elements of the several tissues, it may maintain or even increase their *bulk;* but their *vital properties* are weakened, in proportion to the degree in which this substitution has been effected. Thus, when it takes place in the muscles, it diminishes their contractile power; and when it affects the muscular substance of the heart (which is a very common seat of this change), it renders that organ incapable of efficiently sustaining the circulation. The liver and kidneys too, are very liable to have their structure impaired by this perverted nutrition; and their functions may thus be so seriously interfered with, that life can no longer be maintained. Among the most common seats of this degeneration, however, are the walls of the blood-vessels; which, when affected with it, lose their firmness, and are readily burst by pressure from within; so that, as has been recently ascertained, this change is one of the most frequent causes of those forms of apoplexy and paralysis, which proceed from the effusion of blood into the substance or on the surface of the brain.—Now, it can be easily shown, on physiological grounds, that this departure from the healthy nutrition of the tissues is just what might be expected from the influence of alcohol in deteriorating the character of the blood. For whilst, on the one hand, it diminishes its plasticity (or capacity for becoming organized), on the other, it obstructs the removal of the superfluous fatty matter, which is ordinarily burned-off in the respiratory process; and hence there will be at the same time a less perfect formation of new tissues in the place of those which have been used-up, and a retention of that part of the products of their "waste," which the circulating blood ought to be the means of conveying to the lungs for extrication from the body. This view is entirely borne out by experience; it being a fact which observation has fully esta-

blished, that general or local fatty degeneration is one of the most frequent results of the excessive use of alcoholic liquors; from which it may be fairly inferred, that the more moderate employment of them, if not sufficient of itself to induce such a change, will powerfully concur with other influences that favour its production.

72. *Diminished Power of Sustaining Injuries by Disease or Accident.*—The class of men among whom there is an appearance of remarkable bodily vigour, notwithstanding habitual excess in the use of Alcoholic liquors, consists of those who are continually undergoing great muscular exertion, and who do not only drink largely, but eat heartily. Of this class, the London coal-heavers, ballasters, and brewers' draymen are remarkable examples; many of them drink from two to three gallons of porter daily, and even spirits besides; they are for the most part large, gross, unwieldy men, and are capable of great bodily exertion,—so long, at least, as their labour is carried-on in the open air. But it does not hence follow that they are in a condition of real vigour; for the constitutions of such men break down before they are far advanced in years, even if they do not earlier fall victims (as a large proportion of them do) to the results of disease or injury which were at first apparently of the most trifling character. It is well known to those who have observed the practice of the London hospitals, that when such men suffer from inflammatory attacks, or from local injuries, these are peculiarly disposed to run-on to a fatal termination; in consequence, it is evident, of the deficient plasticity of the blood, of the low assimilative power of the solids, and of the general depression of the whole vital energy, resulting from habitual over-excitement. The want of plasticity of the blood gives to the inflammatory processes an *asthenic*, instead of a *sthenic* character (that is, a character of *weakness*, rather than of *strength*); there is no limitation of their products by plastic effusion, as happens in the formation of an ordinary abscess, but they spread far and wide through the tissues; reducing treatment cannot be borne; and the only hope of success lies in the use of opium and stimulants with nutritious diet, to sustain (so far as possible) the prostrated energy. Thus we see that in such men the slightest scratch or bruise will not unfrequently give rise

to a fatal attack of erysipelas, and that internal organs affected with inflammation rapidly become infiltrated with pus, or pass into a gangrenous state. Hence the surgeon is very unwilling to perform severe operations upon them, knowing that their chance of recovery is but small. The condition of these men, in regard to recovery from injuries, is in remarkable contrast to that of men who have been "trained" to pugilistic encounters; the latter having been brought to a condition of the highest possible health, by active exercise, abundance of nutritious food, occasional mild purgation, and either entire abstinence from fermented liquors, or by the very sparing use of them. Men thus "trained" recover with remarkable rapidity from the severe bruises which they are liable to receive.

73. Although there are now few men who habitually take *wine* to a corresponding extent, or who maintain by active exercise in the open air anything like the same muscular vigour, yet such examples are occasionally met with among the fox-hunting country squires, who spend their whole days on horseback, and pass their evenings in drinking port-wine. Of these, also, the same remark may be made; that notwithstanding their appearance of vigour, they are bad subjects for medical or surgical treatment, owing to the imperfect condition of their nutritive functions.—Among the *spirit*-drinkers of our large towns, it is notorious that the nutritive and reparative powers are low; and of this fact we have a remarkable illustration, in the frequency, among the intemperate, of a certain form of corroding ulceration, whose origin is sufficiently indicated by the term "Geneva-ulcer," by which it is commonly known at Guy's and other metropolitan hospitals. This ulcer, usually commencing on the leg, begins as a red, angry, and painful spot, which passes into an open sore; and this increases rapidly, both in depth and breadth, so as even to involve the whole surface of the calf, laying bare the muscles, tendons, and nerves. It is not confined, however, to gin-drinkers, but it is occasionally met with in the bloated, plethoric, red-faced wine-bibber.

74. *Liability to Epidemic Diseases.*—Another most important indication of the disordered state of the blood and of nutrition, consequent upon habitual excess in the

use of Alcoholic liquors, is the liability of the intemperate to suffer from morbific agencies of an epidemic or pestilential nature. On this last point, there is, the writer believes, no difference of opinion amongst medical practitioners in any part of the world; all being agreed that the habitual drunkard is far more likely to suffer from such agencies, than the habitually sober or temperate man. Whether habitual *abstinence* is still safer than habitual *moderation*, is a point on which there is not so much unanimity of opinion; this question, however, will be considered hereafter (Prop. V.) —The peculiar liability of the habitually intemperate to suffer from the *Cholera-poison*, is well-known. It has been observed in all climates and under all circumstances. In both the epidemics which have visited this country, a very large proportion (estimated by some physicians at five-sixths) of the individuals attacked by it, in whom the liability to the disease could not be attributed to the foul condition of the locality in which they resided, are known to have derived their predisposition to it from habitual intemperance; and the rate of mortality among those attacked bore a constant proportion to their previous abuse of Alcoholic liquors.

Thus Dr. Anderson of Glasgow, states as the result of his experience in the treatment of 225 patients in the epidemic of 1848-9.—"I have found the use of Alcoholic drinks to be the most powerful predisposing cause of Malignant Cholera with which I am acquainted. So strong is my opinion on this point, that were I one of the authorities, and had the power, I would placard every spirit-shop in town with large bills, containing the words *Cholera sold here.*" The mortality of those who were represented to him as having been previously of temperate habits, averaged 19·2 per cent.; whilst among the habitually intemperate, it rose to the enormous proportion of 91·2 per cent.* One of the most respectable and extensive spirit-dealers in High Street, Glasgow, is stated to have said, that "Cholera has cut of at least one half of my customers."—During the epidemic of 1832, it was noticed in Montreal, where 1200 cases of cholera occurred, that "not a drunkard who was attacked has recovered, and that almost all the victims were moderate drinkers."—In Warsaw it was found that 90 per cent. of those who died of cholera, had been in the habit of drinking ardent spirits to excess; and at Tiflis, in Russia, a town of 20,000 inhabitants, every drunkard is said to have been carried off by the disease.

* See the Rev. W. Reid's "Temperance Cyclopædia," p. 58.

Evidence to the same effect is furnished by the marked increase in the number of Cholera-cases which have occurred, when occasions or seasons of festivity have induced unusual excesses during its prevalence.

Thus at Glasgow in 1832, the jubilee held to celebrate the passing of the Reform Bill, occasioned a new and very fatal outbreak of the disease, which was previously almost extinct; and at Gateshead, the week following Christmas-day was signalized by a most terrible fatality, which was obviously attributable to the drunkenness that prevailed in the town, one of the worst streets of which was said to be swept of confirmed drunkards from one end to the other, with very few exceptions. The influence of alcoholic excesses was scarcely less strongly marked in Glasgow, during the second epidemic; a great increase in mortality from cholera taking place during and after the New-year festivities.

The following circumstance, which occurred during the first epidemic of Cholera in this country, is very significant on this point; especially showing that the state of *depression* which follows excitement, is the one in which the system is most readily affected.

The nurses in the Cholera Hospital at Manchester were at first worked six hours, and allowed to go home the other six; and the mortality was so great amongst them, that there were fears of the failure of the supply. It was found, however, that they were much given to alcoholic potations (with the idea, probably, of increasing their power of resisting the malady) during their leisure hours; and they were therefore confined to the Hospital, and debarred from obtaining more than a small allowance of alcoholic drink; after which not a single fresh case occurred among them.

75. *Gout and Rheumatism.*—Among the general disorders of nutrition, to which the intemperate use of Alcoholic liquors certainly predisposes, although it may not of itself cause them, are Gout and Rheumatism. The former is most common among those who have been accustomed both to eat and to drink freely; and it is favoured by such a use of alcoholic liquors, as stimulates the stomach to digest more azotized aliment than the system can appropriate, and at the same time impedes the operations by which the surplus is carried out of the body. Rheumatism, on the other hand, is more apt to affect such as are *poorly* rather than highly fed; but it is not less favoured by the abuse of alcoholic liquors, which, by preventing the due oxygenation of the blood, tends to keep any product of im-

perfect digestion or nutrition in the circulating current, besides of itself disturbing the regular course of these actions.—All scientific pathologists are agreed, that both these diseases are attributable to the presence of morbid matter in the blood; and all practical physicians know that their aim should be to remove this matter as completely as possible. That Gout is often entirely cured by total abstinence from alcoholic liquors, is a well-known fact, vouched for by the highest authorities in medicine; and it is a fact perfectly well-known to those who have much experience in the diseases of the poor, that the severer forms of Rheumatism are far more prevalent among the intemperate than among the sober. The following example "Of the effect of Water-drinking on the Cure of Gout," was communicated a few years since by the late eminent physiologist, Dr. Bostock, to the Medico-Chirurgical Society; the case is understood to have been that of Dr. B. himself:—

The case to which I propose to direct the attention of the Society, is that of a gentleman seventy years of age, who had been, from a very early period of his life, subject to very frequent attacks of gout, the predisposition to which complaint is inherited from his parents. Connected with this, he has been a constant sufferer from stomach-affections of various kinds; acidity, flatulence, heartburn, irregularity of the bowels, and in short, from every one of the affections which are enumerated in Cullen's well-known definition of dyspepsia. His mode of life was regular and moderately active, and his diet what might be styled temperate though not abstemious. He had, indeed, been advised by his medical friends to take wine in moderate quantity; he had occasionally employed ale, porter, and brandy-and-water, but never in what could be considered an excessive quantity. In this way he had passed about forty years, seldom actually confined by indisposition, but almost always subject to a succession of ailments, which rendered it necessary to have recourse to medicines of various kinds, and, more especially, to alkalies, which were taken in large quantity, and, as the symptoms appeared to indicate, to purgatives or to sedatives, and to a variety of tonics and stimulants. During this period, the renal secretion was seldom in what could be considered a perfectly healthy state; it was sometimes loaded with deposits, and of high specific gravity; sometimes of low specific gravity, limpid and aqueous; sometimes very copious, at other times scanty; whilst its chemical constitution was most variable, both as the nature and the proportion of its saline contents.

About four years ago, in consequence of the accession of certain alarming symptoms of a new description, which were supposed to require the antiphlogistic treatment, the patient was ordered by his

medical attendants to reduce his system of diet, and, more especially, to abstain entirely from fermented liquor or distilled spirits of any description. By this restriction, and by other appropriate remedies, the threatened disease was averted. And, besides this fortunate result, *the patient found his general state of health and feelings so much improved by the change of diet, that the abstinence from all kinds of liquors has been strictly adhered to up to the present period.* The effect has been, *that he has lost all the dyspeptic symptoms to which he had been subject for upwards of forty years;* and what I am more particularly desirous of pointing out to the Society, *the renal secretion has been now, for a long period, in a perfectly natural state;* it is nearly uniform in its specific gravity, and is totally free from all the morbid deposits, which were before seldom absent from it. And there is a circumstance connected with it, which I conceive to be particularly deserving of attention; that although of an average specific gravity, and containing the proper proportion of urea and saline ingredients, it is uniformly increased in quantity, so that there has been now, for several months, considerably more of those substances discharged from the system than was formerly the case. It would appear, therefore, that the abstraction of alcohol has produced a more healthy state of the digestive and secreting functions; so that the functions of the kidney are more actively and effectively performed.—"Medical Gazette," Feb. 23rd, 1844.

It is wonderful that with such facts before them, physicians and patients should so obstinately persevere in trying to find out *what* Alcoholic liquors are the *least injurious*, instead of making the simple experiment of abandoning them all.

76.—*Diseases of the Heart and Arteries.*—Closely connected with the gouty and rheumatic diatheses (or constitutional states) are *Diseases of the Heart and Arteries;* of which some obviously arise out of them, and are thus indirectly favoured by the abuse of Alcoholic liquors; whilst others seem to be more immediately dependent upon the introduction of Alcohol into the blood. The continual but irregular excitement of the contractile action of the heart and arteries, which is the result of the habitual use of stimulants, must of itself predispose their tissues to disease; and this predisposition will of course be increased by the contact of blood charged with alcohol with their lining membrane, as well as by the general disordered condition of the nutritive operations. Now attacks of acute inflammation of the arteries seem not unfrequently traceable to alcoholic intoxication; and it cannot, therefore, be regarded as improbable, that those more chronic disorders of their walls, which

give rise to aneurism, softening, fatty degeneration, and other structural changes, and which thereby predispose to hæmorrhage, should be favoured, if not absolutely produced, by the habitual presence of alcohol in the circulating current. Accordingly, we find the intemperate use of Alcoholic liquors specified by authors on the diseases of the heart and arteries as among the most important of their predisposing causes. "In a multitude of cases," says Dr. Latham, "where the lining membrane of the heart has been beset with cartilaginous or atheromatous or earthy deposits, the patients have been habitual spirit-drinkers for years; and the most conspicuous conditions antecedently presented by them, have been the failure of many functions, and the growth of structural disease in many organs, especially those subservient to nutrition."*

77. The foregoing are the principal disorders, local and constitutional, in the production of which we can trace the operation of the habitually excessive use of Alcoholic stimulants, with tolerable directness. It would be easy to extend the list, by the inclusion of other diseases which are manifestly aggravated by intemperate habits; but this, in fact, would require the enumeration of almost every disease to which the human body is subject, more especially if Inflammation participate in it. But the writer thinks it preferable to limit his statements to the cases in which the chain of causation is most continuously and obviously traceable. It has been his object throughout, to show what consequences might be expected to arise from habitual "intemperance,"—regard being had to the facts which have been fully ascertained with respect to the mode of action of Alcohol on the system at large, and on special organs. It has been shown that a variety of disorders of the Nervous system, of the Digestive apparatus, of the Secreting organs, of the Skin, of the Heart and Arteries, and of the organic fluids and solids in general, might be thus anticipated: and that such anticipations are all completely verified by the results of practical observation.

78. *Life shortened by Intemperance.*—We shall close this part of the inquiry, by examining into the general tendency

* "Lectures on Diseases of the Heart," p. 125.

of the excessive use of Alcoholic liquors to shorten life; either by themselves giving rise to the diseases above enumerated, or by increasing the susceptibility of the system to other morbific causes. That such a tendency exists, cannot for a moment be questioned. No Life Insurance Office will accept an insurance on an individual whose habits are known to be intemperate; and if it be discovered after his death that he has been accustomed to the excessive use of alcoholic liquors, contrary to his statement in his proposal for insurance, the policy is declared void. And it is, doubtless, owing in part to the superior sobriety of the great bulk of insurers, over that of the average of the population, that a lower rate of mortality presents itself amongst them, than that which might be expected according to the calculations founded on the entire mortality of the country—to the great profit of the office. Thus at the age of 40 years, the annual rate of mortality among the whole population of England, is about 13' per 1000; whilst among the lives insured in Life Offices, it is about 11 per 1000; and in those insured in Friendly Societies, it is about 10 per 1000.

79. The rate of mortality among persons of intemperate habits, has been calculated by the eminent actuary, Mr. Neison; who states that in the 6111·5 years of life to which the observations extended, 357 deaths had taken place; but if these lives had been subject to the same rate of mortality as the general population of England and Wales, the number of deaths would have been 110 only, or less than *one-third.* At the term of life 21—30, the mortality was upwards of *five* times that of the general community; and in the succeeding twenty years it was above *four* times greater, the difference gradually becoming less and less. An intemperate person of 20 years of age has a probability of life extending to 15·6 years; one of 30 years of age, to 13·8 years; and one of 40 years, to 11·6 years: while a person of the general population of the country would have a like probability of living 44·2, 36·5, and 28·8 years respectively. Some curious results were shown in the influence of the different kinds of drinks on the duration of life: beer-drinkers averaging 21·7 years; spirit-drinkers 16·7 years; and those who drink both beer and spirits indiscriminately 16·1 years. These results, however, were not more curious

than those connected with the different classes of persons. The average duration of life, after the commencement of intemperate habits among mechanics and labouring men, was 18 years; among traders, dealers, and merchants, was 17 years; among professional men and gentlemen, 15 years; and among females, 14 years only.

80. The greatest number of deaths which had taken place from any one class of maladies, was from Head-diseases (nervous system), namely, 97, or 27·1 per cent. of the whole number of deaths; of these, 57 were recorded under the head of Delirium Tremens. The next in order was Liver disease and Dropsy, from which the number of recorded deaths among the intemperate was 82, or 23·3 per cent. Now the proportion of deaths from head-diseases in the whole mass of the population of England and Wales above 20 years of age, was only 9·71 per cent.; and the proportion of deaths from liver-disease and dropsy, only 6·24 per cent., so that the relative fatality of head-diseases among the intemperate, as compared with other causes of death, is nearly *three times as great* as that which exists among the temperate population; whilst the relative fatality of liver-disease and dropsy, is nearly *four times greater* among the former than among the latter.—According to the estimate of Mr. Neison, there are 64,806 drunkards in England and Wales, or one in every 145 of the population; of these 53,583 are males, being one in 74 of the whole male population; whilst 11,223 are females, being one in 434 of the female population.

PROPOSITION III.

THE HABITUAL MODERATE USE OF ALCOHOLIC LIQUORS HAS A TENDENCY TO PRODUCE MORBID ACTIONS IN THOSE ORGANS ESPECIALLY ACTED-ON BY THEM, WHICH MANIFEST THEMSELVES IN VARIOUS CHRONIC DISEASES OF ADVANCED LIFE.

81. THE consequences of the *excessive* use of Alcoholic liquors, as proved by the experience of the medical profession, and universally admitted by medical writers, having thus been shown to be precisely such as the study of its effects in poisonous and immediately fatal doses would lead us to anticipate, we are further justified in expecting that the habitual use of these liquors, in smaller quantities, if sufficiently prolonged, will ultimately be attended, in a large proportion of cases, by consequences prejudicial to the human system,—the morbid actions thus engendered being likely to be chronic, rather than acute, in their character. And, as such morbid actions are actually found to be among the most common disorders of persons advanced in life, who have been in the habit of taking a "moderate" allowance of alcoholic liquors, there is very strong ground for regarding them as in great degree dependent upon the asserted cause; although the long postponement of their effects may render it impossible to *demonstrate* the connection.

82. It may not be amiss to remark, at the outset of this inquiry, that it is through the medium of the *Water* contained in the animal body, that all its vital functions are carried on. No other liquid than water can act as the solvent for the various articles of food which are taken into the stomach. It is water alone, which forms all the fluid portion of the blood, and thus serves to convey the nutritive material through the capillary pores into the substance of the solid tissues. It is water, which, when mingled in various proportions with the solid components of the various textures, gives to them the consistence which they severally require. And it is water, which takes up the

products of their decay, and by a most complicated and wonderful system of sewerage, conveys them out of the system. It would seem most improbable, then, that the habitual admixture of any other fluid,—especially of one which, like Alcohol, possesses so marked a physical, chemical, and vital influence upon the other components of the animal body,—can be otherwise than injurious in the great majority of cases; and where a benefit *is* derivable from it, this will depend upon the fact that the abnormal condition of the system renders some one or more of the special actions of alcohol *remedial* instead of *noxious*, so that the balance becomes on the whole in favour of its use.

83. In asserting that, to the ordinary use of Alcoholic liquors in "moderate" quantity, during early and middle life, and to the habitual excess in diet (however slight) to which this commonly prompts, we are to attribute many of the chronic disorders of the Digestive apparatus, Excreting organs, and Nervous system, which are among the most common ailments of advancing years, we may seem to go beyond the positive teachings of experience. The consequences are so remote, that we may not appear to be justified in attributing them to the causes we have assigned. But let it be remembered that we have multitudes of other cases, in which the long-continued agency of morbific causes, of comparatively low intensity, has been proved to be not less potent in the end, than the administration of a poison in a dose large enough to produce its obviously and immediately injurious effects. Thus, a man who would be rapidly suffocated by immersion in an atmosphere of carbonic acid, may live for weeks, months, or years, in an atmosphere slightly contaminated by it, without experiencing any evil effects which he can distinctly connect with its influence; and yet, who will now deny that the constant action of this minute dose of aërial poison is insiduously undermining his vital powers, and preparing him to become the easy prey of any destructive epidemic? So, again, we see that a brief exposure to the pestilential atmosphere of the swamps of the Guinea coast, is often sufficient to induce an attack of the most rapidly-fatal forms of tropical fever; but it may be long before the dweller among the marshy lands of temperate climates, inhaling the paludal poison in

its less concentrated form, becomes affected with intermittent fever; yet no one has any hesitation in recognizing the connection of cause and effect in the latter case, as in the former. So, again, the resident in a town, where the insufficiency of the drainage causes the surface-moisture to be imperfectly carried off, and to be not merely charged with the malaria of vegetable decomposition, but with the miasmatic emanations of animal putrescence, may long be free from serious disorder, if the cause does not operate in sufficient intensity; yet he becomes liable in a greatly increased degree to the operation of almost every morbific agent, and especially to that of the various forms of fever-poison; and no one who has paid even a slight degree of attention to the results of the sanitary inquiries which have now been carried-on for many years past, hesitates in admitting the relation of cause and effect between insufficiency of drainage and the higher rate of mortality in undrained localities, although not only days and weeks, but months and years, may be required for the operation of that cause upon the animal system.

84. Should we not, then, be running counter to all analogy, if we did not hold ourselves ready to admit, that such an habitual departure from the *regular* play of the principal organs of the body, as even the "moderate" use of Alcoholic stimulants tends to produce, must be likely to have remotely-injurious results; and are we not justified in assuming a relation of cause and effect to exist, when we find such results occurring precisely as we should predict? If the medical man has no hesitation in regarding those severer derangements of the digestive and excretory organs, which are so common amongst those who commit habitual excesses in eating and drinking, as the consequence of those excesses, why should he refrain from attributing the milder but more protracted disorders of the same organs to the less violent but more enduring operation of the same cause?—"The little I take, does me no harm," is the common defence of those who are indisposed to abandon an agreeable habit, and who cannot plead a positive benefit derived from it; but before such a statement can be justified, the individual who makes it ought to be endowed with the gift of prophecy, and to be able to have present to his

mind the whole future history of his bodily fabric, and to show that, by reducing the amount of his excess to a measure which produces no immediately-injurious results, he has not merely postponed its evil consequences to a remote period, but has kept himself free from them altogether.' The *onus probandi* lies with those who assume the *absence* of a connection, which is indicated by every fact with which we are acquainted.

85. But it has been maintained, that although Alcohol cannot itself serve as an article of nutriment, yet that, like Salt, it is a valuable adjunct to other articles; and that, although in large quantity it may be decidedly noxious, yet that in small, it may be very beneficial. Now, strange to say, the substance with which it has been thus compared, is that of all others, to which it will least admit of being truly likened. For salt is not a mere casual adjunct to our necessary food, but is itself an indispensable ingredient of our diet. It is contained in large proportion in the blood, and in every fluid that is secreted from it, and enters into the composition of most of the tissues. It is present, too, in most of the ordinary articles used as food, vegetable as well as animal; and when this natural supply is deficient, the instinctive craving, both of man and animals, leads them to resort to other sources, from which their bodies may derive the supply necessary for the maintenance of their normal or healthful constitution. Moreover, there is a very beautiful provision in the economy for the immediate excretion (through the urine) of any superfluity of this substance, which passes out of the body nearly as rapidly as it is taken in; so that it is prevented from ever accumulating to an undue amount in the blood; and the only mischief which an overdose of it can occasion, is the production of a temporary irritation of the stomach, occasioning a craving for water, which speedily works a cure by carrying off the offending matter.—Now all that Salt *is*, Alcohol *is not*. It is *not* one of the proper components of the blood or of the tissues, and its presence in the circulation is entirely abnormal. There is no instinctive or natural craving for it; the passionate longing for alcoholic liquors being seldom experienced save by those who have made themselves the slaves of a bad habit. And although there is a provision

in the system for freeing the blood from it, when it has found its way into the current of the circulation, yet that provision (the gradual oxidation of the alcohol, and its elimination through the lungs in the form of carbonic acid and water), is comparatively tardy in its operation; so that much mischief is likely to be done before it can take effect. So, again, whilst the worst effect of a large dose of Salt, or of smaller doses frequently repeated, is to produce a slight irritation of the alimentary canal, which a copious draught of water suffices to remove, there is no dispute that the effects of Alcohol in very large doses are decidedly *poisonous*, in virtue of its powerful narcotic action on the nervous system; and that the frequent repetition of considerable doses is almost certain to produce the most serious effect in the end, although that effect may be postponed for weeks, months, or even years.

86. *Effect upon the Digestion.*—In considering this subject, we shall first examine into the effect of the habitual "moderate" use of Alcoholic beverages upon the *digestive* process, whose activity they are commonly asserted to improve. Now this reputed improvement must have reference either to the capacity for disposing of a greater quantity of food than the healthy stomach would easily digest, or to an augmentation of the activity and energy of the digestive power, in its operation on the food which the system really requires. Now it may be reasonably asked:—If the natural appetite be already good enough to give a relish to the food which the body really needs, can the artificial production of an increased appetite be necessary or desirable? And if the stomach be already capable of digesting and preparing as much nutriment as may be required to keep up the solids of the blood to their proper amount, can any but prejudicial consequences result from forcing it to execute these operations at a more rapid rate? Two classes of evils may be expected to proceed from such a system:—in the first place, by constant reliance upon an artificial stimulus, the natural powers of the stomach itself must be in danger of becoming gradually impaired;—and secondly, the habitual introduction of more alimentary material into the circulating current than the nutritive functions can appropriate, must predispose to disorder of the system in general, and of the excretory organs.

87. Every Physiologist must admit, that the Creator has made the action of the Stomach of a healthy man to depend upon no other conditions, than those which are required for the welfare of the system at large. Wholesome food and drink, containing the elements of the tissues and fluids of the body, without mixture with deleterious snbstances, pure fresh air, moderate bodily and mental labour, alternating with sufficient intervals of repose—these are the essential conditions of health; and we find not only individuals, but whole nations, in the enjoyment of thoroughly good digestion, and preserving the 'tone of the stomach' to the end of a long life, without the assistance of bitter beer or any other stomachic. It is notorious, however, that any departure from these conditions tends to injure the digestive power. Unwholesome food or drink, or excess in what is wholesome, habitual confinement in ill-ventilated apartments, over-exertion of mind or body, or (what is not less injurious) inadequate exercise of either, insufficient or too much protracted sleep; these and various other departures from the rules of health, have a direct tendency to impair the digestive power; and it is by artificially provoking the languid stomach to increased exertion, that a temporary benefit is derived from alcoholic liquors in such cases, which is so commonly mistaken for real support. The case is exactly parallel to the effect of similar "assistance" upon the muscular system, when already overcome with fatigue; a feeling of temporary refreshment and reanimation is induced; the flagging powers are revived; and the exertion is continued and completed with far more ease than it could have been without the comforting draught. But what says the preacher, or pedestrian, or hard-worked artisan, next morning? The fatigue *then* experienced is far greater than if he had given-in when nature warned him; and a longer period of repose is necessary to recover from it.

88. Now if bitter beer, or any other favourite malt liquor habitually taken in "moderation," has any influence at all upon the functional activity of the stomach, that influence must be either to ***increase***, to ***diminish***, or to ***pervert*** that which is natural to it. From the language used by the advocates of these liquors, it may be presumed that they would choose the former of these alternatives; and it will

then be for them to reply to the question,—What good can arise from habitually exciting an organ, that is already in a state of healthful activity? It would be just as rational for a man who already sleeps soundly through the whole night, to take an habitual narcotic for the purpose of improving his repose; or for a man who finds no difficulty in maintaining the erect posture by the natural action of the muscles of his back, to construct an artificial support for the purpose of relieving them of the strain which they are adapted to bear. Every one knows that, in either of these cases, the organ thus *assisted* will gradually lose its own independent vigour, and will come at last to *require* the artificial support, without which it could at first have discharged its full share of duty. And experience shows, in like manner, that those who have long been habituated to the "moderate" use of alcoholic beverages with their meals, are seldom able to discontinue them without a temporary loss of appetite and of digestive power; unless, indeed, their place be supplied by the more wholesome excitement of fresh air and exercise.

89. With many persons, the evil, so far as the stomach is concerned, may seem to be confined to the induction of this state of reliance on artificial aid. Year after year passes away, without any indication that its powers have been overtasked, or that any unhealthy change has taken place in its circulation or nutrition; and the usual dose of the alcoholic stimulant appears still to produce its wonted effect. But this does not show that the practice is really innocuous. We have seen that whilst a potent dose of a poison speedily manifests its action by the violence of its effects, the repeated introduction of minute doses is not really inoperative, although the effects are not speedily apparent. If the stomach be not an exception to the general law of the action of stimulants upon the animal body, we should expect that by the habitual over-excitement of its function, in however trifling a degree, its vital energy will undergo a premature depression; and that the result of the "moderate" use of alcoholic stimulants will manifest itself, sooner or later, in diminution of the digestive power.

90. Such is most commonly the fact; the earliest indication of it being, in most instances, the demand for the

augmentation of the amount of stimulus, to produce the same result; that which was at first sufficient to whet the appetite and increase the digestive power, being no longer found adequate. If the demand be yielded-to, and the quantity of the stimulus be augmented, the original benefit seems for a time to be afforded by it; but after the stomach has become tolerant of the liquor, that which at first excited it to increased functional activity does so no longer, and a further increase is called for; until what began in "moderation" ends in positive *excess*, with all its consequent evils. But supposing this demand not to be felt, or not to be yielded to, the same "moderate" allowance being indulged in for a long course of years, we should anticipate that injurious consequences, though perhaps long postponed, must ultimately show themselves; and that such is the case, is unfortunately the experience of a vast number, who suffer, by that "loss of tone" of the stomach which is so common an attendant of advancing years, for the too great activity to which the organ has been previously forced, during the long period of early and middle life. And although the common idea, that alcoholic liquors when taken in small quantities have a *tonic* property, may render it difficult for some to coincide in the conclusion that the real effect of the habitual use of even this small quantity must be of the opposite kind,—exhaustive instead of tonic; yet as this idea has no other foundation than the temporary assistance derived from the stimulating powers of alcohol, it ought not to prevent our recognition of the consequences which might be theoretically expected to proceed from its long-continued action.

91. It is not here maintained, however, that the habitual employment of Alcoholic stimulants in small quantity, even when coupled with habitual excess in the amount of food ingested, *uniformly* stands to the loss of appetite and digestive power so frequent with the advance of years, in the relation of cause and effect; for there can be no doubt that the habit may be persevered-in by some individuals throughout a long life, without the manifestation of any injurious results; whilst on the other hand, it cannot but be admitted that the disorder in question may be induced in other ways. But the existence of exceptional cases by no means invali-

dates an argument based upon general experience; any more than our occasionally meeting with individuals who have daily consumed a bottle of spirits, and have yet enjoyed a hearty old age, warrants us in rejecting the evidence which indicates that such a consumption would have, in *by far* the larger proportion of mankind, a decided tendency to shorten life. Again, it does not follow, that because the loss of digestive power may be justly attributed to other causes when this one has been wanting, it has been inoperative when present; and, as we shall presently see (§ 98), its operation may be rather indirect than direct, by the temporary support which it affords under an expenditure of nervous energy that ultimately exhausts the powers of the system.

92. *Upon the System at large*, the effect of an habitual introduction of more alimentary material than the nutritive functions can appropriate, seems to vary with the temperament. In some individuals this is converted into blood, so that the normal amount of that liquid undergoes an augmentation; thereby inducing a state of *plethora*, which is favourable to local congestions and inflammatory diseases, and which especially predisposes to hæmorrhage—this being an effort of nature to relieve the undue fullness of the vessels. But in other constitutions, the superfluous aliment would seem to be never so far vitalized and assimilated, but speedily degenerates and becomes excrementitious; the lungs, the liver, the kidney, and the skin, are thus called upon to remove, not merely the products of the normal waste and disintegration of the system, but also the superfluous non-assimilated matter; and hence they are brought into a state of undue functional activity, which cannot but render them particularly susceptible of derangement. The excretory action of the lungs, however, is chiefly regulated by the temperature (§ 109); so that, when it is diminished by external warmth, more remains to be accomplished by the other depurating organs; which, therefore, will be more prejudicially affected by any excess of diet in a warm, than in a colder atmosphere.

93. This is precisely what experience teaches. From habitual excess in diet, in *temperate* climates, in persons not of sanguineous temperament, disorders both of the liver and

kidneys are very apt to arise; those being most liable to the former, who have not the power of generating fatty tissue, at the expense of the surplus of non-azotized food; and those being most liable to the latter, in whom the too free use of alcoholic liquors occasions an undue determination of blood to the kidneys. On the other hand, habitual excess of food in *warm* climates usually manifests itself first in disorders of the liver; since the diminished excretion of carbon by the lungs causes the blood to proceed to the liver more highly charged with that element; whilst at the same time, the consumption of that part of the biliary secretion which should be normally oxygenated and carried-off through the lungs, is interfered with. On the other hand, the skin, whose functions are greatly increased in activity, comes to the assistance of the kidneys in disposing of the superfluity of azotized aliment, the perspiration being charged with a considerable amount of *urea*. This result of what is accounted the "moderate" use of Alcoholic liquors in warm climates, for the purpose of increasing the appetite and stimulating the digestive powers of the stomach, is much dwelt-upon by writers on tropical diseases; who represent it as, in the long run, not less hurtful than that excess which produces effects more immediately and obviously pernicious. In this point of view it ranks with high-seasoned dishes, and those other seducing provocatives to the diminished appetite and lessened digestive powers of the residents in such climates, which, by occasioning the habitual ingestion of more food than the system requires, are among the most fertile sources of tropical disease.

94. It cannot, then, be fairly maintained that even a small habitual excess in diet, induced by the stimulating action of Alcoholic liquors, will be without its remote consequences upon the general system; even though it may be for a time sufficiently compensated by increased activity of the excreting organs. Nor are the disorders of the liver and kidneys, which are so frequent among those who have been accustomed to this mode of living for many years, without (as they believe) any injurious consequences, to be less surely set down to it, than are those congestive and inflammatory diseases of the abdominal viscera, which so much more speedily follow upon habitual excess in warm climates.

For the excreting organs cannot be *always* kept in a condition of *excessive* activity; like other parts of the system, they suffer sooner or later from too great an exaltation of their function; and if this should not pass, as it often does, into an inflammatory condition, it is almost certain to be remotely followed by a state of depressed activity, in which the nutrition of the organ becomes impaired, so that it is left, during the remainder of life, in a state by no means equal to the performance of its regular duties.

95. We have been thus led to inquire into the pernicious influence exerted by the "moderate use" of Alcoholic stimulants upon the *Excretory Organs*, in augmenting the amount of labour they are called upon to perform, by favouring the reception of too large an amount of alimentary matter into the system. But there is another point of view under which its results must be considered; namely, the direct influence of the alcoholic stimulus upon the organs themselves, especially the Liver and Kidneys, in augmenting their functional activity. This influence may for a time be corrective of the other, and may thus aid in concealing and retarding its evil consequences. But although a system of compensation is thus maintained, whereby the effects of excess are neutralized for a time,—it is *only* for a time; for as surely as any organ is habitually exerted in an excessive degree, so surely must its vital powers be prematurely exhausted; the remoteness of the period at which the flagging of its power begins to manifest itself, being inversely to the degree of its habitual over-excitement. Hence we have additional reason for imputing a considerable proportion of those chronic disorders of the excretory organs to which reference has been more especially made, to the habitual employment of Alcoholic liquors, in what is ordinarily considered to be a "moderate" amount, and regarded as perfectly consistent with health, if not required to maintain it.

96. It would be absurd, however, to affirm that such diseases *always* proceed from this cause; since those who practise total abstinence from Alcoholic liquors are by no means proof against other errors in dietetics; and in so far as they habitually take more food than their system needs, they will be liable to suffer from disorder of the

organs whose duty it is to eliminate the waste. But they will be much sooner warned of the excess they have committed, if the stomach refuses to digest the superfluity, instead of being forced by artificial stimulation to an undue exertion of its power; and an attack of indigestion, by early giving a salutary check to the practice, may ward-off its remoter consequences. It is the freedom from such checks, up to a certain time of life, which encourages in those who habitually use fermented liquors in "moderation," and who at the same time practise habitual though slight excess in the amount of solid food which they consume, the delusive belief that in neither case are they doing themselves any harm.

97. *Effect upon the Nervous System.*—Every medical man is familiar with cases, in which the "wear and tear" of an over-active life has been sustained with little apparent loss of power for perhaps a long series of years: but in which there is a sudden failure both of mental and bodily vigour, as manifested in deficiency of power of continued mental exertion, depression of spirits, want of appetite, enfeebled digestion, and the whole train of disordered actions consequent upon this condition. It is not to be denied that such a state may arise quite independently of the agency, direct or indirect, of habitual stimulation; one instance, in particular, is strongly present to the writer's recollection, in which it supervened on a long course of excessive mental exertion, in an individual who was most moderate in everything but the labour of his brain, and who rarely or never had recourse to Alcoholic stimulants for artificial support. But the most common case is that, in which two sets of causes are in action together. An habitual course of over-exertion of the nervous system may be maintained for a longer time by most persons, with the assistance of alcoholic stimulants, than without them; and thus the delusion is kept up, that the strength is not really overtasked; when the fact is, on the contrary, that the prolongation of the term of over-exertion, by the repeated application of the stimulus, is really expending more and more of the powers of the nervous system, and preparing for a more complete prostration at a later period.

98. The temporary advantage, then, which is thus gained,

is very dearly purchased. The man who habitually abstains, not merely from Alcoholic liquors, but from other artificial provocatives (misnamed supports) to the endurance of mental activity, is early warned by the failure of his intellectual energy and cheerful tone of spirits, that he is overtasking his brain; whilst his stomach tells the same tale in another way,—the failure of power to digest that which the fabric really needs for its regeneration, being indicative of an exhaustion of nervous energy. A short period of rest and change, in such a condition, is usually sufficient for the renovation of the system, and for the recovery of the mental and bodily vigour. But the case is very different, when the effort has been sustained for a lengthened series of years, by means of the delusive support afforded by alcoholic liquors; for as the excessive expenditure of nervous power has been greater, so is the exhaustion more complete; and as the stomach has been longer over-excited and overtasked, its tone is the more seriously injured, not merely by the depression consequent upon its own overwork, but by the impairment of the nervous power required for its due activity.

99. Thus, then, although the consequences of habitual over-exertion of the Brain may be less speedily felt, when the stomach is kept up, by alcoholic stimulants, to a state of extraordinary activity of supply,—and although, in like manner, the habitual use of alcoholic stimulants may cause the stomach to be less susceptible of the loss of the accustomed energy,—yet, when the crisis does come, each condition aggravates the other; the effects of undue disintegration of the nervous matter being more difficult to repair, when the nutritive apparatus is depressed in functional power; and the restoration of the tone of the stomach being impeded by the deficiency of nervous energy, when this has been lowered by excessive action of the brain. The length of time then required for the cure, is proportional to the duration of the causes which have induced the malady; and tedious and difficult is the progress of restoration, as every medical man well knows. We shall hereafter have occasion (§§ 212—217), to consider the best methods of medical and hygienic treatment for this condition; and shall show that the measures which experience now proves

to be most efficacious in restoring the vigour of the system, are precisely such as the physiologist would recommend, under the guidance of the preceding views of the causation of the morbid state in question.

100. *Effect upon the Circulation.*—It may be difficult to prove that the ingestion of a *small* quantity of alcoholic liquor, taken in conjunction with food, has any decidedly stimulating influence upon the general Circulation; since a certain acceleration of the pulse, and an increase in its fulness, normally occur during digestion; and the augmentation produced by the alcohol may be so trifling as to be scarcely detectible. Such augmentation, however, is certainly produced by the imbibition of a quantity usually accounted "moderate;" and we have now to inquire whether it can recur habitually through a long series of years, without producing injurious results. There cannot be a doubt that, in a healthy person, the rate of the circulation is proportioned to the amount of functional activity of the principal organs of the body. We find that it depends in great degree upon muscular exertion, as put forth in the maintenance of the erect posture, and still more in active exercise; but it may be accelerated also by exalted activity of the nervous system, which sets up an unusual demand for blood in the brain; and its increase of rate during the digestive process appears to be connected with the large supply of blood then transmitted to the chylopoietic viscera, and required for the due performance of their several offices. Now whenever the circulation undergoes any considerable acceleration, there is a tendency to a recurrence of local congestions, arising from the want of power, on the part of the vessels of some particular organ, to allow their current to pass at the same rate with the rest. Of this we have a familiar example in that accumulation of blood in the pulmonary arteries, which is liable to take place in most persons during violent muscular exertion, producing the feeling of being "out of breath;" and which is particularly marked in such as labour under some disordered condition of the lungs, that obstructs the passage of blood through their capillaries.

101. There are few persons, however, in whom there is not some tendency to an *irregularity* of the circulation, which ma-

nifests itself in a torpor in some parts, and an undue activity in others. One of the most common forms of this, especially among individuals who exercise their brains more than their muscles, is a torpor of the current in the extremities, and an undue activity in the cephalic circulation; so that the head is habitually heated, whilst the hands and feet are cold. Now where such is the case, we find that even the normal acceleration produced by the ingestion of food aggravates this disordered condition; so that the face becomes more flushed, and the head more hot after meals, than at any other time.* Precisely the same result is observable in such persons, after the use of even a small quantity of alcoholic stimulant; and the habitual production of it cannot but be injurious, as tending to establish that inequality which it should be our endeavour to counteract.

102. Similar inequalities exist in different individuals, in regard to other organs; thus it very frequently happens that the liver is the part in which a disposition to torpidity of circulation exists; and congestion of its portal system of vessels must stagnate the whole of the circulation through the chylopoietic viscera, from which the blood of that system is derived. Any such disposition to local congestion must operate with increased force in producing general irregularity of the circulation, when the rate of movement is unduly accelerated; just as the outlets to a theatre, which suffice to discharge the entire audience in a few minutes, when the pressure towards them is uniform and regular, are speedily so blocked-up as to produce a stagnation of the entire current, whilst, under the influence of an alarm of fire, every one is rushing toward them with undue haste. And as we have seen that hepatic and abdominal congestions are among the ordinary results of excess in the use of alcoholic liquors (§ 61), it cannot be doubted, but that even their moderate employment must aggravate any tendency to such derangement of the circulation, when it already exists. No such derangement can be habitual, and be thus continually liable to aggravation, without laying a foundation

* The acceleration produced by muscular exercise, will of course be unattended by this result; the cause of the acceleration being such as to divert the current from the brain to the limbs, and to make it pass through them with energy and rapidity.

for other more serious disorders. So, again, as we have seen that habitual excess in alcoholic liquors has a tendency to produce determination of blood towards the kidneys, and thereby to favour the development of many serious diseases in those organs, we can scarcely refuse to admit that where they already possess the least tendency to disordered action, it must be aggravated by the habitual recurrence of such a slight increase in the afflux of blood to them, as would of itself attract no attention.

103. If it be said that, in thus reasoning upon probabilities, we are going further than experience warrants us in doing, we must again take leave to draw support from the analogical argument on which we have already dwelt (§ 83). The whole tendency of modern pathological research has been to show, that the human frame, if endowed with an ordinary amount of inherent vigour, is no otherwise incident to disease, than as it is in various ways subjected to the agency of causes which produce a departure from the normal play of its functions; and that although old age and decay are inevitable, diseases are not, being preventible in the precise proportion in which we are able to discover and eradicate their causes. And when we can clearly trace a relation of cause and effect, between obvious and flagrant violations of the rules of health, and the occurrence of certain forms of *acute* disease, we seem justified in assuming that minor but habitual violations of the same kind must be allowed to participate (at any rate) in the production of *chronic* diseases of the same order. The very nature of chronic disease implies a prolonged action of the causes in which it arises; for no such determinate alteration of the normal functions as it involves, can be at all accounted-for by any temporary causes of perversion;—these either inducing a transitory disorder, or, if acting with sufficient intensity, exciting an attack of acute disease. In chronic disease we find that the organ has, so to speak, *grown to* its perverted action; so that no curative measure is permanently beneficial, which does not first act by withdrawing the cause of original departure from the healthy state, and by placing the organ in the best condition for its recovery. We are fully justified, therefore, by all that we know of the causes of disease, in asserting that the habitual use of Alcoholic liquors by healthy individuals,

even in small quantities, is likely, when sufficiently protracted, to favour the development of such chronic disorders as originally depend upon an irregularity in the movement of the circulating current, or are liable to be augmented by it.

104. *Effect upon Nutrition.*—There appears, moreover, to be an adequate amount of evidence, that the practice in question has an unfavourable influence upon those nutritive operations, by which the alimentary materials first converted into blood are applied to the regeneration of the living tissues. This influence is not very clearly manifested in the ordinary course of these operations; yet the considerations already adduced (§ 71), render it extremely probable that the "fatty degeneration" of the various tissues and organs of the body, which has been shown by modern pathological research to be the essential cause of many of the most severe and irremediable diseases of advanced life, is greatly promoted by the habitual use of Alcoholic liquors; since the tendency of the presence of alcohol in the blood is undoubtedly to obstruct that removal of the fatty matter from the tissues, which is essential to its replacement by their proper materials. —But the injurious influence of the habitual use of Alcoholic liquors becomes more obvious, when any extraordinary demand is made upon the regenerative powers, for the repair of injuries occasioned by accident or disease. It is well known to Surgeons, that the most desirable of all modes by which the reparation of wounds can be effected, is the simple adhesive process, known as "union by the first intention;" and that where, in consequence of loss of substance, union by the first intention cannot be effected, the most favourable method is that which is termed "the scabbing process;" in which, a hard crust being formed upon the surface, so as to protect it from the irritating action of the atmosphere, a continued growth or re-formation of tissue takes place beneath, without any interruption from inflammatory action, until complete filling-up has been effected, and a new cutaneous surface is formed beneath the scab. But it too frequently happens that the reparative processes cannot be induced to take place after either of these fashions, but that inflammatory action is set up in the wound, and matter forms between its lips, or beneath the scab, rendering its

detachment necessary, and thus re-converting the wound into an open sore. The healing of this sore must be accomplished by the much less healthy process of suppurating granulation; during the progress of which a large amount of nutritive material runs to waste as purulent discharge, whilst a great degree of constitutional irritation is often set up; and the best termination of which is the formation of a cicatrix, or scar, that subsequently undergoes an unsightly and often inconvenient contraction, from which the new tissue formed under a scab is free.

105. Now the occurrence of the first of these modifications of the healing process, is an obvious indication of such a healthful condition of the nutritive operations as can repair the effects of an injury in the most complete manner, with the least possible waste of nutritive material, and with the most entire absence of constitutional disturbance, whilst, on the other hand, the impossibility of procuring it even under the most favourable circumstances of rest, fresh air, and wholesome aliment, indicates that the nutritive functions are *not* in their normal condition. Amongst the lower animals we seldom find injuries repaired in any less favourable mode, unless the part be placed in circumstances adverse to this healthy action. But among "civilized" communities of men, the case is very different; for the occurrence of the scabbing process, in the case of any but trivial wounds, is the exception, not the rule,—being, in fact, so rare that many surgeons never think of attempting to bring it about. Now that there is nothing essentially different in the constitution of Man, which places him in this respect at a disadvantage as compared with the lower animals, appears from the fact that all who have visited "savage" nations, in whom more constant exposure to air is practised, and who enjoy immunity from many diseases which exist among civilized communities, have been struck with the facility with which wounds heal in their bodies, and with their remarkable freedom from that constitutional disturbance, which amongst ourselves almost invariably follows severe injuries. Thus Hawkesworth, in his Voyage to New Zealand, makes particular mention of "the facility with which wounds healed that had left scars behind them, and that we saw in a recent state: when we saw the man who had been shot with the

musket-ball through the fleshy part of the arm, his wound seemed to be so well digested, and in so fair a way of being perfectly healed, that if I had not known no application had been made to it, I should certainly have inquired with a very interested curiosity after the vulnerary herbs and surgical art of the country." Of these people he states, that at that period water was their sole and universal liquor.

106. Now, it would be absurd to maintain that the habitual "moderate" use of Alcoholic liquors is the *sole* reason of the rarity of this healthful operation of the reparative process amongst ourselves; since a multitude of other departures from the laws of health are continually practised by almost every member of a civilized community. But if we look to the unquestionable fact, that habitual excess in the use of such liquors produces a condition altogether *opposed* to the healthful performance of these processes, so that the slightest scratch or abrasion may give rise to a rapidly-fatal attack of inflammation (§ 72), it can scarcely be denied that where a minor departure from the normal condition shows itself, and the same cause has been in action, in less intensity, that departure may be reasonably considered, in part at least, as its effect. And this conclusion is remarkably confirmed by the surgical experience of the late campaigns in India, on occasions on which there had been, from accidental causes, an interruption in the usual supply of spirits. Thus Mr. Havelock, in his "Narrative," in reference to the wounded, after the victories in India, observes:—"The medical officers of this army have distinctly attributed to their previous abstinence from strong drink the rapid recovery of the wounded at Ghuznee." And Mr. Atkinson, in his work on Affghanistan, is more explicit, stating that "all the sword cuts, which were very numerous, and many of them very deep, united in the most satisfactory manner; which we decidedly attributed to the men having been without rum for the previous six weeks. In consequence, there was no inflammatory action to produce fever and interrupt the adhesion of the parts."

107. From the foregoing considerations, then, we seem entitled to draw the general conclusion, that, in the "average man," the habitual use of Alcoholic liquors, in moderate or

even in small quantities, is not merely unnecessary for the maintenance of bodily and mental vigour, but is unfavourable to the permanent enjoyment of health, even though it may for a time appear to contribute to it. For, as it is justly remarked by Dr. Robertson, "that man only is in good health, who recovers rapidly from the simple accidents incidental to his occupation, and from the simple disorders incidental to his humanity and to the climate he lives in, and who can bear the treatment that those accidents or those disorders demand;" and if such be not the case, we may feel confident, that however vigorous the condition of the system may appear, its power is destined to give way at a period much earlier than that of its normal duration. And if it be true, as we have endeavoured to show, that the effect of the habit is not merely to induce certain predispositions to disease by its own agency, but also to favour almost any of those which may already exist in a latent form, we have an additional right to affirm, that even the most moderate habitual use of Alcoholic liquors becomes to the "average man" positively injurious, if protracted for a sufficient length of time to allow of the development of its effects.

PROPOSITION IV.

THE PRECEDING CONCLUSION, AS TO THE REMOTELY-INJURIOUS EFFECTS OF THE "MODERATE" USE OF ALCOHOLIC LIQUORS, IS BORNE OUT BY THE COMPARATIVE RAPIDITY WITH WHICH SIMILAR RESULTS DEVELOPE THEMSELVES IN TROPICAL CLIMATES.

108. IT is a fact too well known to require the citation of evidence in support of it, that the intoxicating effects of Alcohol are developed with much greater rapidity in a *heated* than in a *cold* atmosphere. Thus a quantity of spirit which a man can take without any obvious disturbance of his mental or bodily powers, when exposed to the keen air of a frosty day or of a mountain-summit, may produce complete drunkenness when taken under a burning sunshine; and individuals who are not aware of this fact sometimes become intoxicated, without having exceeded the allowance which they believed to be perfectly compatible with sobriety. Again, it has been continually observed that when Alcoholic liquors are taken during the performance of severe labour in an extremely high temperature, their temporary stimulation is followed by a very rapid and decided failure both of nervous and muscular power; so that even those men who drink largely of such liquors in the intervals of their work, are obliged to abstain from them whilst their labour is in progress.

109. This result is perfectly conformable to the physiological principles already referred to; for when the blood becomes charged with alcohol by absorption from the alimentary canal, an eliminating action is set up for its purification, this being chiefly accomplished by the respiratory process, which effects the oxidation of the alcohol, so that it is gradually set free in the condition of carbonic acid and water (§§ 6—8). Now the *rate* at which this process is carried on, will depend in great measure upon the activity with which the respiratory action is performed; and it has now been fully demonstrated, that the absorption of oxygen and the extrication of carbonic acid, which mark the rate at

which the combustive process is performed, take place with far less rapidity in a warm than in a cold atmosphere, the system having in itself the power of regulating the amount of matter which it shall burn-off, in order that its heat may be kept up to the proper standard. Thus it was ascertained by the experiments of Letellier, that the amount of carbonic acid set free by Birds, when they are breathing in an atmosphere of from 86° to 106° Fahr., is scarcely more than *one-third* of that which they generate in an atmosphere of 32°; and by similar experiments upon small Mammalia, it was ascertained that they only give off, between 86° and 106°, about *half* as much carbonic acid, and between 59° and 68° about *two-thirds* as much, as they generate at 32°. The experiments of Vierordt upon his own person lead to a similar conclusion in regard to Man; although the difference is not so great. For he states that the average amount of carbonic acid exhaled by him per minute, between the temperatures of 24° and 47° Fahr., was 18¼ cubic inches; whilst the average between the temperatures of 66° and 92° was but 15¾ cubic inches.

110. Hence it can be easily understood, that under exposure to severe cold, the characteristic effects of Alcoholic liquors (especially when taken at intervals, in small quantities at a time), are but little felt, the alcohol being burned off before it can accumulate so as to exert any considerable influence on the nervous system;—whilst, under the influence of external heat, when the combustive process is greatly reduced in activity, the specific effects of alcohol are more rapidly produced and more powerfully exerted. And we should expect this to be the case, too, with regard to those remoter effects, which indicate not merely *functional* disorders produced by a depravation of the exciting fluid—the blood,—but *structural* disorders proceeding from a perverted state of nutrition of the organ itself. For the more slowly the alcohol is eliminated from the blood, the more constantly will it be present (when habitually introduced even in small quantities) in the circulating current. And its presence will operate in two ways, as already pointed out; namely, on the one hand, by the perversion which it will itself effect in the nutritive process, especially as regards the nervous system,—and, on the other, by pre-

venting the due elimination of the refuse matters of the body, which *ought* to be removed from the blood by that combustive process to which the respiration is subservient.

111. Now it is universally admitted by all who have attended to the subject, that the effects of *excess* in the use of Alcoholic liquors are developed with *far greater rapidity* in tropical climates than in colder regions. Upon this point there is no difference of opinion, either among medical writers, or among any persons who have had adequate opportunities of observation.—The intimate acquaintance of Sir Charles Napier with the habits and wants of the Indian soldier can be doubted by no one; and the following is his testimony on this point (delivered in his own characteristic manner) as contained in his address to the 96th Regiment, when he reviewed it at Calcutta on the 11th of May, 1849:—

"Let me give you a bit of advice—that is, don't drink. I know young men do not think much about advice from old men. They put their tongue in their cheek, and think that they know a good deal better than the old cove that is giving them advice. But let me tell you that you are come to a country where, if you drink, you're dead men. If you be sober and steady, you'll get on well; but if you drink, you're done for. You will be either invalided or die. I knew two regiments in this country, one drank, the other didn't drink. The one that didn't drink is one of the finest regiments, and has got on as well as any regiment in existence. The one that did drink has been all but destroyed. For any regiment for which I have a respect (and there is not one of the British regiments that I don't respect) I should always try and persuade them to keep from drinking. I know there are some men who will drink in spite of the devil and their officers; but such men will soon be in hospital, and very few that go in, in this country, ever come out again."

112. The influence of excess in the use of Alcoholic liquors in directly producing sickness and mortality, or in predisposing to it, is most remarkable in those tropical regions in which other causes of disease exist in the greatest potency. It would seem, indeed, that the more unhealthy the station, the more freely do the residents at it usually indulge in alcoholic stimulants; either from the mistaken idea that these enable them to withstand the effects of the climate, or from the desire that their life, if short, shall be a merry one.

Some years since, the writer, being himself in the island of St. Vincent, in the West Indies, met with a gentleman resident in Tobago, who informed him that the average annual mortality amongst the Europeans of that island was about *one in three*. Upon inquiry into the habits of the residents, it was found that intemperance prevailed to a most fearful extent among them; few getting up in the morning without their glass of sangaree (wine and water), and the strength of their beverage gradually increasing during the day, until it arrived at neat brandy at night. He further spoke of it as no uncommon occurrence for a party of friends who had been at a drinking-bout, to be summoned, within two or three days, to the funeral of one or two of their number. This gentleman was himself apparently quite indisposed to recognize between these occurrences any relation of cause and effect; being obviously under the belief that, if it were not for the protecting influence of good wine and brandy, his life would be worth a yet shorter purchase. We shall be led, however, by the evidence about to be adduced, to a different conclusion.

113. On the other hand, the writer having on various occasions sought for information from those who had preserved their health during a long residence in tropical climates, as to their habits in regard to the use of Alcoholic liquors, has almost invariably found that they had practised extreme moderation, if not total abstinence. It is in great part to the difference in their habits in this respect, that we are to attribute the marked difference in the rate of mortality from diseases of hot climates, which is shown by the Army Returns to exist between the *ordinary soldiers* and their *officers*, and which is greater according to the unhealthiness of the station. Now although a certain part of this difference must be admitted to be due to the superior character of the officer's lodging, and to his partial exemption from the fatigue and the exposure to which the soldier is liable, yet it must obviously be chiefly attributed to the difference in the manner of living between the soldiers and the officers; the former being allowed a regular ration of spirits, and many of them getting as much more as they can; whilst the latter are now comparatively abstemious, drinking wine or beer in place of spirits, and this to a much less extent than formerly. With regard to the Indian service, the writer has been informed by Lieutenant-Colonel Sykes, who has paid great attention to the statistics of the Indian army, that since it has become the custom among the officers to drink bitter ale in place of wines or spirits,—that is to say,

a beverage containing a *minimum* of alcohol, in place of those containing a *maximum*—the rate of mortality among them is so greatly diminished, that promotion is no longer expected to take place more rapidly in the Indian army than in other departments of the service. The extreme injury done by intemperance to the Indian troops, may be judged-of from the statement which the writer has received from a medical officer, that within two months after the arrival of the order for the discontinuance of temperance societies,* he had *eighty* cases of delirium tremens in his own regiment.

114. That the liability to climatorial disease is by no means inevitable, and that it is especially to be avoided by the adoption of the habits in regard to diet, &c., of the native population, where that is healthy—is the testimony of all those who have had most extensive opportunities of forming a judgment on the subject. The two following citations from different publications,—the one by Lieutenant-Colonel Sykes, who was himself long resident in India, —the other by Dr. Daniell, assistant surgeon to the forces, who has had the superintendence for a considerable time of some of the most unhealthy stations on the Western Coast of Africa,—will carry with them great weight:

"I never followed a farinaceous or vegetable regimen myself in India," says Colonel S., "nor do I recommend it to others; but I ate moderately and drank little, and I have a strong conviction that much of European disease in India is traceable to over-stimulus, and that the mortality among the European troops will not be lessened, until the European soldier is improved in his habits, until he is made to understand that temperance is for the benefit of his body, libraries for the benefit of his mind, exercise for the benefit of his health, and savings' banks for the benefit of his purse. *The climate of India is less to blame than individuals; for in case foreigners find the people in a country healthy, they should, to a certain extent, conform to the habits of the natives to be healthy also.*"†

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* The authorities at the Horse Guards, who have taken the extraordinary step of putting down Temperance Societies in the army, on the ground that every organization but the regimental is contrary to the discipline of the service, can scarcely be supposed cognizant of what they have to answer for.

† Vital Statistics of the Indian Army, in "Journal of the Statistical Society," vol. x. p. 184.

So with regard to Africa, Dr. Daniell says:

"It is a well-known fact that the notorious insalubrity of Africa has frequently served as the scape-goat on which the blame of those evil consequences (resulting from the reprehensible indulgence of dissipated courses) might be unreservedly thrown, without the risk of their being disputed or questioned."*

And again, when describing the Bight of Benin, one of the most pestilential localities on the surface of the globe, he says:

"And yet, amid these regions so rife with disease and death, I have known Europeans reside for a number of years in the enjoyment of good health, from the simple secret of moderately conforming to the habits of the natives as regards their diet, exercise, and attention to the due performance of the cutaneous functions."†

115. The evidence of statistics, however, is more valuable on this point, than the mere affirmation of individuals, however trustworthy; and to this, as set before us by Colonel Sykes, we shall now proceed. The per-centage annual mortality from sickness, of the three armies of Bengal, Bombay, and Madras, for the twenty years previous to 1847, has averaged as follows:—

	Bengal.	Bombay.	Madras.
Native	1·790	1·291	2·095
European	7·380	5·071	3·846

This table presents some very remarkable features. In the *first* place, the striking contrast between the rate of mortality of the European and of the native troops, serving together, and exposed to the same morbific causes. *Secondly*, the great difference between the mortality of the troops serving in the different presidencies. And *thirdly*, the circumstance that in the Madras presidency the rate of mortality is *highest* amongst the native troops, and *lowest* among the Europeans.

116. Now on the first point Colonel Sykes remarks:

* "Sketches of the Medical Topography and Native Diseases of the Gulf of Guinea, Western Africa," p. 13.

‡ Op. cit. p. 61.

"I will not say that the question is absolutely solved by the reply, 'Habits of Life;' but I will say, reasoning from analogy, that the reply goes a great way to solve it. The European soldier in India is over-stimulated by food, over-stimulated by drink, and under-stimulated in mind and body. The European soldier eats a quantity of animal food every day of his life; he drinks a quantity of alcohol every day of his life to the amount of a bottle of spirits in every five days, two drams being served out to him daily; and he has not any mental, and little bodily exercise. Happily the pernicious practice has been recently discontinued; but time was, when the European soldier was compelled to take his dram by eight o'clock in the morning, with the thermometer varying from 70° to 90° or more, at different seasons of the year, leaving him in a state of nervous irritation and thirst, which could only be relieved, as he thought, by further potations; indeed I have been assured within the last few days by a pensioned artillery staff-serjeant, *who never drank in India, and was only in hospital five days during twenty-one years' service*, that he has known, out of a detachment of 100 artillerymen, no less than eight men in strait-jackets at one time, absolutely mad from drink. Now animal food, with the assistance of such an auxiliary, and combined with mental vacuity, go far to account for the excess of mortality amongst Europeans."

117. The question next arises, why the mortality of the European troops in the Madras presidency should be so much less than that of the others, being about *three-fourths* that of the Bombay troops, and but *little more than half* that of the Bengal army; whilst on the other hand, the mortality of the Native troops in the Bombay army is but *little more than two-thirds* of that of the Bengal army, and *less than two-thirds* that of the Madras army. There do not seem to be any such differences in the climatorial diseases, or in the character of the military stations, of the three presidencies, as are by any means sufficient to account for this discrepancy; and if there were, we should expect them to manifest themselves alike in the Native and in the European army. That the reverse is the case, must be admitted to be a cogent argument, if not a complete proof, in favour of the insufficiency of any such account of the discrepancy. The following are the causes assigned by Colonel Sykes:—

The *Bengal* European army have no supply of porter, but are furnished with rum, a spirit not so wholesome as arrack. On the other hand, the *Madras* army consume large quantities of porter, and drink comparatively little spirit, what they do consume being arrack. The *Bombay* troops have only recently commenced the consumption of porter, and the spirit they drink is understood to be more wholesome

than rum, and less so than arrack. "These results," says Colonel Sykes, "are certainly not conclusive; but I cannot help associating the increased consumption of malt liquor by the Madras Europeans with their comparative healthiness; and the gradations of the mortality in the Bengal and Bombay European troops as partly influenced by the quality (no doubt much more by the quantity) of the spirits they respectively consume."

This inference is fully borne out by the remarkable diminution in the rate of mortality which has taken place among the Bengal and Bombay European troops since the period to which Colonel Sykes's Report refers; the substitution of malt liquor for spirit-rations having brought down their percentage nearly to the level of that of the Madras army.

118. On the other hand, the excess of mortality in the Native army of Madras above that of the Bengal and Bombay Native troops, is equally attributable to a difference in the habits of the individuals composing it.

"Of the *Bombay* army," says Colonel Sykes, "six-eighths consist of Hindoos, and considerably more than half of the whole army are Hindostanees. These men never taste meat, fish, or spirituous liquors, but live, I may from personal observation venture to say, almost exclusively upon unleavened cakes of wheat or other cerealia, baked upon an iron dish, and eaten as soon as cooked. The great majority of the *Bengal* army consists of a similar class of men. The *Madras* army in its constituents is the reverse of the other two. In the cavalry there are from 6 to 7 Mussulmans to 1 Hindoo, and in the infantry there is 1 Mussulman to every $1\frac{1}{2}$ or $1\frac{3}{4}$ Hindoos; but amongst the latter there is a considerable number of low castes without prejudices about food, and unrestrained by the prejudices of caste; therefore the majority of the native troops of the Madras army can eat and drink like Europeans."

Thus then we see, that whereas in the Madras army, in which the European and Native habits most closely assimilate, the mortality of the former was *less than double* (about 38 to 21) that of the latter; the mortality of the Bengal Europeans was *nearly six times* (about 74 to 13) that of the Bombay Natives; this difference bearing such a relation to the greater abstemiousness of the Native soldiers, and the larger consumption of spirits by the Europeans, that it is scarcely possible to avoid the inference that they must be connected in the relation of effect and cause.

119. The following returns are of value, as showing the proportion of sickness between the members of *Temperance*

*Societies** in the European regiments serving in India, and the soldiers not members of these societies; the average daily number of men in hospital of each class being stated for each of the first six months of 1838, and the per-centage being calculated with reference to the strength of each division.

Months.	Strength of the Temperance Societies.	Strength of remaindor of Regiment.	Relative proportions admitted into Hospital.		Average daily per-centage of Men in Hospital.	
			Temperance Societies.	Remainder of Regiment.	Temperance Society.	Remainder of Regiment.
Jan. .	1953	2569	1 in 18·77	1 in 9·22	2·54	8·15
Feb. .	1840	2639	1 in 20·10	1 in 9·24	2·27	1·27
March	1542	2879	1 in 14·44	1 in 7·14	2·94	8·66
April.	1359	3081	1 in 10·90	1 in 5·26	5·47	10·28
May .	1282	3161	1 in 18·44	1 in 6·35	5·21	10·66
June .	1364	3075	1 in 19·53	1 in 6·37	4·55	10·35
Total .	9340	17,354	1 in 16·47	1 in 7·28	3·65	10·20

120. Thus it appears that, on the whole, the daily per-centage of invalids among the members of the Temperance Societies was but 3·65; whilst in the remainder of the troops it was 10·20, or nearly three times as great. The Cameronian Regiment stationed in Fort William in the years 1837 and 1838, lost only *twenty-six* men in the first of these years, and *twenty-two* in the second; whereas the average mortality in Fort William, for a period of fourteen years previously, had been nearly *seventy-two*. The proportion of the regiment which belonged to the Temperance Society, was continually varying; but the general result of its operation was, that since the arrival of the regiment in India, its annual consumption of spirits diminished from 10,000, 12,000, and even 14,000 gallons, to 2,516; the amount drunk in 1837 having been 9,763 gallons less, and in 1838, 8,242 gallons less, than the regiment was entitled to draw. On the other hand, a considerable amount of beer and wine had been drunk; but these beverages are far less injurious to health, especially in India, than distilled spirits.

* In these societies, the pledge simply held the members to abstinence from distilled spirits, and from excess in the use of any fermented liquor.

121. Having learned that the 84th regiment of Her Majesty's Foot has for some time past enjoyed the reputation of being one of the most temperate and well-conducted regiments in the European portion of the Indian army, the writer has consulted the Army Medical Returns, for the purpose of ascertaining whether its rate of mortality has differed in any marked degree from the average given above; more especially since it has been quartered at Secunderabad, which lies under the bad repute of being one of the most unhealthy stations in the Madras Presidency. That this bad repute is well deserved, is shown by the fact that the annual mortality, for an average of fifteen years previously to 1846-7, has been 7·5 per cent.; *nearly double* the average of the whole Presidency, and *more than double* the average of the other stations. The evil seems traceable to the insufficient barrack-accommodation, rather than to the condition of the surrounding country; for one-third of the men are obliged to sleep in the verandahs, and the remainder have by no means a due allowance of fresh air; whilst the officers of the regiment quartered there, and the artillery company, who are better lodged, have not shown any excess of mortality above the average.

122. Now in the year 1846-7, the average strength of H.M. troops in the Madras Presidency was 5,963, and the number of deaths was 251, or 4·21 per cent.; which is rather above the average mortality in this Presidency, calculated by Colonel Sykes from the returns of twenty years. During the first eight months of this period, the 84th regiment was quartered at Fort St. George, Madras, which is considered a healthy station; it then performed a march of between four and five hundred miles to Secunderabad, in an unusually wet season, the roads (such as they were) being in some parts knee-deep in water;* and it took up its quarters at Secunderabad, about two months previously to the date of the return (April 1st, 1847). The medical return of the regiment for this year presents us with the almost unprecedentedly low number of *thirteen* deaths in an average strength of 1,072 men; the mortality being thus at the rate of only 1·21 per cent. Now, during the same

* Of this march a more particular account will be given further on.

period, the 63rd regiment, which was quartered at Secunderabad up to February 1st, 1847 (or nine months out of the twelve), lost *seventy-three* men, which was at the rate of 7·88 per cent. for the entire year; whilst the mortality for *all the other* stations in the Madras command was only 3·02 per cent. for the same year. Hence we see that the mortality of the 84th regiment for the year 1846-7, was only *two-fifths* of that of the average of the *healthier* stations in the Madras Presidency, which average its own very low rate contributed to reduce; whilst that of the 63rd regiment was $2\frac{1}{2}$ times as great as the average, and $6\frac{1}{2}$ times that of the 84th.

123. During the year 1847-8, the total mortality in the Madras Presidency was 227 to 6,040 of average strength, or 3·76 per cent.; but this reduction from the preceding year was not due to any considerable difference in the rate of mortality at the other stations, being almost entirely consequent upon the diminution in the number of deaths at Secunderabad. For the 84th regiment, which remained at that station during the whole year, lost in that time no more than *thirty-nine* men out of an average strength of 1,132, so that its per-centage mortality was only 3·49; which was *below the general average* of the Presidency, and *less than half* the average rate at Secunderabad for fifteen years previously.—It seems impossible to attribute these remarkable results to anything but the abstinent habits of the soldiers of this regiment; a large proportion of them being *total abstainers*, and those who were not so being *very moderate* in their consumption of alcoholic liquors.

124. Thus we see that the nearer the approach made by Europeans in India to *habitual abstinence* from Alcoholic liquors, *the lower is their rate of mortality*, as determined by the infallible test of statistical comparison, applied to large bodies of men similarly circumstanced in other respects. Still, as in all these statistics, there is a simple separation of the *total abstainers* from the *non-abstainers*, it has been in the power of the advocates of "moderation" to say:—We admit that *excess* is bad, and the superiority in health and longevity of total abstainers over drunkards is a palpable fact, especially in India; but the *intemperate* must be

excluded, if you wish to prove the case of *total abstinence* as against *temperance*." This has now been done in the Government Return of the sickness and mortality of the European troops forming the Madras army, for the year 1849; in which the men are classed as *total abstainers*, *temperate*, and *intemperate*. The following are the remarkable results brought out by this mode of arrangement.

Classes	*Teetotalers.*				*Temperate.*			
Strength	450.				4,318.			
Diseases.	Admitted.	Died.	Ratio of Admission to Strength per Cent.	Ratio of Deaths to Strength per Cent.	Admitted.	Died.	Ratio of Admission to Strength per Cent.	Ratio of Deaths to Strength per Cent.
Fevers	141	1	31·333	0·222	768	1	17·786	0·023
Cholera	..	..	..	..	17	13	0·393	0·301
Dysentery, Acute and Chronic	52	3	11·555	0·666	344	31	7·966	0·717
Diarrhœa	50	1	11·111	0·222	348	4	8·059	0·092
Other Diseases of Stomach and Bowels	23	..	5·111	..	337	6	7·804	0·138
Hepatitis, Acute and Chronic	26	..	5·777	..	249	16	5·766	0·370
Disease of the Lungs	43	..	9·555	..	478	17	11·069	0·393
Do. Brain	14	..	3·111	..	108	1	2·501	0·023
Rheumatic Affections	27	..	6·000	..	487	..	11·278	..
Dropsies	..	..	..	..	2	..	0·046	..
All other Diseases	213	..	47·332	..	2,976	11	68·920	0·254
Total	589	5	130·888	1·111	6,114	100	141·593	2·315

Classes	*Intemperate.*				*Total.*			
Strength	942.				5,710.			
Fevers	190	2	20·169	0·212	1,099	4	19·246	0·070
Cholera	7	6	0·743	0·636	24	19	0·420	0·332
Dysentery, Acute and Chronic	112	15	11·889	1·592	508	49	8·896	0·858
Diarrhœa	108	..	11·464	..	506	5	8·861	0·087
Other Diseases of Stomach and Bowels	112	2	11·889	0·212	472	8	8·266	0·140
Hepatitis, Acute and Chronic	96	2	10·191	0·212	371	18	6·497	0·315
Disease of the Lungs	113	4	11·995	0·424	634	21	11·103	0·367
Do. Brain	82	5	8·704	0·530	204	6	3·572	0·105
Rheumatic Affections	143	1	15·180	0·106	657	1	11·506	0·017
Dropsies	1	..	0·106	..	3	..	0·052	..
All other Diseases	1,060	5	112·525	0·530	4,249	16	74·412	0·279
Total	2,024	42	214·861	4·458	8,727	147	152·831	2·574

125. From these it will be seen, that whilst the number of deaths among 450 *total abstainers*, during the year 1849, was 5, or 11·1 per 1000, the number among 4,318 *temperate* men was 100, or 23·1 per 1000, being rather more than *double* the previous proportion. As to the *intemperate*, the increase is frightful; for among 942 such men, the number of deaths was not less than 42, or in the *quadruple* ratio of 44·5 per 1000.—It is worthy of remark, that the number of admissions for *sickness* among the total abstainers was but little less than that which presented itself among the temperate, being 130·8 in the former, and 141·5 in the latter; but it is obvious, from the comparatively low rate of mortality among the former, that their disorders were of a far less degree of severity.

126. Now, in applying these facts to the question of the remote effects of Alcoholic liquors upon the human system, it must always be borne in mind that the poisonous character of a substance must not be judged of by its effects in *any particular instance* or *set of instances*, but by the aggregate of the cases in which it is fully brought to bear upon the system. We are constantly generating in our own bodies the most deadly poisons as the products of their decay; yet there is such an admirable provision for their removal from the blood as fast as they are introduced into it, that they can never accumulate there, save by some disorder in the excretory operations; and an artificially-increased activity in these operations may prevent the usual effects, even of deadly poisons introduced from without, from declaring themselves. Hence in estimating the true relation of Alcohol to the living body, we are not to take as the basis of our reasoning, those cases in which, by reason of the small quantities in which it is introduced, and of the activity of the respiratory process—promoted by a low temperature, fresh air, and active exercise,—it is removed from the blood as fast as it enters it; but those cases in which it is *habitually present in the circulating current*, either by reason of the larger quantity in which it is introduced, or in consequence of the diminished activity of the processes by which it is got rid of. Let a "moderate" quantity of alcohol be taken by a set of individuals subjected to a tropical atmosphere, shut up during a large part of the twenty-four hours in close ill-ventilated apartments or tents, and exposed to the epi-

demic influence of cholera or fever; and the sure test of statistics shows us the terrible fatality of the results. But the individuals on whom the alcohol-poison thus acts, are said to die of Cholera, Fever, etc., as the case may be; the alcoholic beverages they have drunk are never suspected; and it is only when the comparative immunity of the Total Abstainer is demonstrated by such analyses as we have given, that the poisonous influence of Alcohol comes in for its due estimation in the result.

127. We see, then, that whilst the "moderate" use of Alcoholic liquors greatly increases the mortality of those who employ them in hot climates, it does so, not in virtue of any *peculiar* action which it there exerts upon the system, but simply by an *exaggeration* (so to speak) of that which it exerts elsewhere. Hence, if its influence can be shown to be attended by such *fatal* consequences *in India*, the conclusion seems inevitable that its *tendency* must be *injurious everywhere;* although its actual effect is reduced by the more rapid elimination of the alcohol from the circulating current, which takes place in cold climates. The *general fact* appears, then, to be, that the injurious influence of alcohol upon the system is exerted in proportion to the *amount* and to the *duration* of its *presence in the blood;* that the habitual use of small quantities in tropical climates is equivalent, both in the effect which it must produce upon the blood, and in its actual results upon the system in general, to that of a much larger amount in cold or temperate climates; and that, as it cannot be present, even for a short time, in the circulating current, without producing *some* departure from the healthful course of the vital actions, the continual repetition of such perversion must *in the end* bring the system into a condition less favourable to the continuance of health, than it would have been if total abstinence from alcoholic drinks had been the rule of practice. The evil result which shows itself in India in the course of a few years, may be expected, therefore, on these grounds, to manifest itself in Britain at a later period of life; and this conclusion is in such complete harmony with the facts adduced under the preceding head, that they afford the strongest confirmation to the general principle there enunciated, as to the remotely-injurious effects of even the most "moderate" *habitual* employment of Alcoholic liquors.

PROPOSITION V.

THE CAPACITY OF THE HEALTHY HUMAN SYSTEM TO SUSTAIN AS MUCH BODILY OR MENTAL LABOUR AS IT CAN BE LEGITIMATELY CALLED-ON TO PERFORM, AND TO RESIST THE EXTREMES OF HEAT AND COLD, AS WELL AS OTHER DEPRESSING AGENCIES, IS NOT AUGMENTED (AS IS COMMONLY SUPPOSED) BY THE USE OF ALCOHOLIC LIQUORS; BUT, ON THE CONTRARY, THEIR USE, UNDER SUCH CIRCUMSTANCES, TENDS POSITIVELY TO IMPAIR IT.

128. THE evidence which is abundantly furnished alike by Science and by Experience, in support of this proposition, may be arranged systematically under the following heads:

1. Endurance of *severe and sustained Bodily Labour.*
2. Endurance of *severe and sustained Mental Exertion.*
3. Endurance of *extreme and continued Cold.*
4. Endurance of *extreme and continued Heat.*
5. Endurance of *extreme Vicissitudes of Temperature.*
6. Power of resisting *Morbific Agencies.*

1. ENDURANCE OF SEVERE AND SUSTAINED BODILY LABOUR.

129. All bodily exertion is performed by the immediate instrumentality of the *Muscular* apparatus, which is called into play by the agency of the *Nervous* system. It is requisite, therefore, that we should begin by enquiring into the conditions under which their powers are respectively put forth; and the following may be stated as fundamental positions, in which all Physiologists are now agreed.

I. Both the Nervous and Muscular systems require, for the energetic development and due maintenance of their respective powers, that their tissues be adequately supplied with the *Materials of growth and regeneration;* whereby they shall be able to repair the effects of that loss which is involved in every exercise of their properties, and also, by developing additional tissue, to meet increasing demands upon their functional activity.

II. The *functional activity*, both of the Nervous and

Muscular systems, involves the *destruction* of a certain amount of their component tissues, by the agency of *Oxygen:* the evolution of their peculiar forces being apparently dependent upon the return of the living tissue to the condition of dead matter, and upon the union of their materials with the oxygen supplied by the blood, whereby new compounds are formed.* The retention of these compounds in the circulating current, would be detrimental to the vivifying qualities of the blood; and their continual elimination from it, therefore, is especially provided for.—Both these systems consequently require, as the condition of their highest activity, that they shall receive an adequate supply of Blood charged with oxygen, and purified from the contaminating matters taken up by it in the course of its previous circulation through the system.

III. If, through general poverty of the Blood, the Nerves and Muscles be inadequately nourished, it is impossible that their normal power can be developed, except under the influence of stimulants, and then only for a short time.

IV. If, on the other hand, the Blood be imperfectly charged with Oxygen, it cannot supply a sufficient amount of that element for the performance of those chemical changes, which are involved in every action of the muscular and nervous apparatus. And if, besides being deficient in oxygen, the Blood be charged with the products of the previous disintegration of the tissues, their functional power must undergo a marked diminution, in consequence of the deleterious influence which such matters exercise upon them, so that every exertion of that power is attended by fatigue; and as it produces a continual addition to the amount of refuse-matters in the blood, it cannot be long sustained.

130. Now it may be accepted as an indubitable fact in Organic Chemistry, that there is not the slightest relation of composition between Alcohol and Muscular tissue; and all our present knowledge of the subject tends to prove, that

* This doctrine may be made more intelligible by the analogy of the galvanic battery. For the evolution of the electric force by this apparatus, is dependent upon the oxidation of the zinc plates which form part of it; and the amount of force thus evolved, has a certain definite ratio to the weight of the metal which ceases to exist *as such* by entering into new combination

the albuminous matters of the blood, at the expense of which that tissue is formed, cannot be *generated* within the body of man, or of any other animal, but are derived immediately from the food. We cannot regard Alcoholic liquors, then, as contributing to the nutrition of Muscular tissue; except in so far as they may contain albuminous matters in addition to the Alcohol, which is the case to a slight degree with "malt liquors." But these matters would have the same nutrient power, if they were taken in the form of solid food; and the proportion in which they exist in any kind of malt liquor is so small, that they may be fairly disregarded in any discussion on its nutritive value.

131. We cannot speak with the same positiveness, in regard to the *impossibility* of any assistance being afforded by Alcohol in the nutrition of the Nervous system; since Alcohol is less dissimilar in composition to the substance of Nerve, than it is to that of Muscle. But there are two circumstances, which render it *highly improbable* that Alcohol can ever be converted into Nervous matter.—In the first place, we have no other example of an organic compound being found applicable to the nutrition of the animal tissues, which is the product of incipient *decay* or decomposition; yet this is strictly the case with Alcohol; and we can scarcely imagine, therefore, that it can be an appropriate material for the formation of the most active and important part of the whole animal mechanism.—Again, we have no other example of the application of an organic compound to the nutrition of the animal tissues, which exerts upon any of them such a decidedly *poisonous* influence in large doses, or which has such an obviously-injurious effect upon their nutrition when continually taken in smaller quantity. as we have seen to be exerted by Alcohol.

132. As we seem justified by the laws of Physiology, therefore, in assuming that Alcoholic liquors cannot supply the first of the conditions just enumerated as requisite for the development of the physical power of the nervous and muscular apparatus, we have next to consider what is its capacity in regard to the second. It may be safely affirmed that the introduction of Alcohol into the blood cannot stand in the place of Oxygen, which is essential to the functional activity of the nervous and muscular systems; on the con-

trary, its presence in the blood rather tends to impede the oxidation of their organic components, both by the more cogent demand for oxygen which it sets up for itself, and also by the preventive influence which it is well known to exercise over the oxidation of other organic substances (§§ 6—8, 71). In both these modes, it must not only interfere with that action of the Oxygen of the blood upon the Nervous and Muscular tissues, which is essential to their functional activity, but it must also tend to check the removal by oxygenation of those products of decomposition, whose continuance in the blood is attended with most serious injury to the system.

133. But although we are led by these physiological considerations, to regard the *regular* employment of Alcoholic liquors as rather a detriment than an aid to the development of Nervo-Muscular power, there is a third point towards which we have to direct our inquiry; namely, whether the peculiar *stimulating* effect of Alcohol, which is especially exerted upon the Nervous system, may not enable a greater amount of nervous energy to be produced, and a greater amount of muscular power to be thereby called forth, than could be generated without its aid. In considering this question, it is most important to keep in view the difference between a *temporary* and a *sustained* effort. We have seen that the usual effect of a moderate dose of Alcohol is, in the first instance, to produce an increase in the force and rapidity of the circulation, and in the activity and energy of the functions of the Nervous system; and both these conditions will be favourable to the development of muscular power, so long as they continue. But such a state cannot long endure. We may increase the amount of Nervous power developed in a given time, by the influence of Alcoholic stimulants; or we may prolong its generation for a limited period by the same kind of assistance, when it would otherwise have failed. But as every exertion of Nervous power, like that of Muscular, involves the death and decay of a certain amount of the tissue by which it is evolved, a limit is thus set to the possibility of its generation; so that we find the continuance, or even the increase, of the stimulus, ceasing after a while to produce any effect; and the exhausted power can only be recovered by a lengthened period

of repose, which shall allow time and opportunity for the regenerating processes to be performed at the expense of nutrient material derived from the blood, and for the accumulation of refuse-matter to be drawn-off from the circulating current. Until this has been effectually accomplished, the Nervous power is at least as much *below* par, as it previously was *above* it; so that the loss is certainly equivalent to the gain. And the more the Nervous system has been forced, by the influence of Alcoholic stimulants, to give forth its powers beyond their natural limit, whether as to duration or intensity, the greater will be the degree and duration of that subsequent depression, which speaks so unmistakeably of the need of rest and renovation.

134. Hence, therefore, we should anticipate, that although the use of Alcoholic stimulants may enable a greater amount of physical force to be put forth within a *limited* time, than could otherwise be generated, they can be of no assistance in the *sustentation* of nervo-muscular power; and if the tendency of Alcoholized blood to disorder the nutrition of the tissues (§ 68) be also taken into the account, we should be led to expect that, in the long run, severe bodily labour will be better borne without Alcoholic stimulants than with them,—provided always that the digestive apparatus be in good working order, and be adequate to prepare that amount of alimentary material, which is required for the regeneration of the tissues disintegrated by use.

135. We have now to inquire how far the results of *practical experience* are coincident with these deductions from scientific principles; and whether it is found on actual trial, that complete abstinence from Alcoholic liquors is favourable, or the reverse, to the endurance of severe bodily labour.—It cannot be denied that the ideas current, among the labouring classes more especially, as to the teachings of experience on this point, are opposed to the theoretical doctrines here advanced. But there are many circumstances which should lead us to mistrust the popular voice on such a question, and to seek for proofs of a kind that may be more firmly relied on. The "universal experience" of former generations might be quoted in favour of a multitude of absurd notions, which we now treat as simply ridiculous; and when there is this additional complication, that the liking for

Alcoholic liquors is such as very readily to make "the wish father to the thought," we find an additional ground for suspicion. But the chief cause of our mistrust is this,— that there is no appreciation in the popular mind, of the connexion between the *immediate* and the *remote* effects of Alcoholic stimulants. A glass of malt liquor, or a small quantity of spirits, repeated three or four times a-day, is found to increase the bodily vigour *for a time;* and this increase is set down as so much positive gain, no account being taken of the subsequent depression, which is consisidered as ordinary fatigue. Evidence of this kind is therefore of little or no value; and the only facts that can be admitted as having any weight, are those which bring into comparison the total amount of labour executed *with* and *without* the aid of fermented liquors, during lengthened periods of severe toil; these being the indications, not of the amount of force which may be *temporarily* put forth, but of that which can be *habitually* exerted; and therefore of the *general vigour of the system*, rather than of its *power in a state of excitement.*

136. It would be easy to cite several modern testimonies (to say nothing of the ancient ones) in favour of the superiority of the Abstinence principle, from the published experience of individuals, whose statements might be firmly relied on. Such examples, however, might be regarded as exceptional, because *individual*, and as affording no contradiction of the supposed *general* result of experience. They prove, however, that there is nothing positively incompatible, in the habit of total abstinence from Alcoholic liquors, with the sustenance of a high degree of nervo-muscular power. And it may be well to fortify this position with some additional testimonies, relating to cases in which the power of endurance was very severely tried in various ways. — The following are among the most striking results of the Author's own inquiries upon this point:

The following statement, forwarded to the writer from Leeds, was signed by thirty-four men (and he was assured that many more signatures might have been easily obtained) engaged in laborious employments; out of whom twelve belonged to the class whose occupations are commonly regarded as peculiarly trying, seven of them being

furnace-men at foundries and gas-works, two of them sawyers, one a whitesmith, one a glass-blower, and the last a railway-guard.—"We, the undersigned, having practised the principles of total abstinence from all intoxicating liquors during periods ranging from one to ten years, and having, during that time, been engaged in very laborious occupations, voluntarily testify that we are able to perform our toil with greater ease and satisfaction to ourselves (and we believe more to the satisfaction of our employers also) than when we drank moderately of these liquors; our general health and circumstances have also been considerably improved."—This testimony is extremely valuable, as giving the comparative results of *abstinence* and *moderation*; it being often objected to statements of this kind, that they are only true of the difference between *abstainers* and *drunkards*.

The Author has before him two other testimonies from operatives in Glasgow, whose employments are peculiarly laborious—one being a sawyer, and the other a moulder in an iron-foundry—both giving, as the result of eleven years' experience of total abstinence, that they could do more work, better, and with less fatigue, than when they had recourse to Alcoholic stimulants.

A nail-maker in Glasgow has assured the Author, that after years experience of the abstinence system, he "found hard work easier, and long hours more readily to be endured;" and that, being a member of the fire-brigade, he was on one occasion called upon for continuous exertion for *seventy-three* hours, which he sustained with no other beverage than coffee and ginger-beer, while all his comrades "were beat, and fell away." All experience goes against the possibility of any kind of *stimulation* being kept up for so long a period.

When visiting Messrs. Boulton and Watt's celebrated factory at the Soho, Birmingham, some years since, the Author was much struck by the Herculean aspect of a particular workman, who was engaged in forging the steel dies (used in coining) into the massive blocks of iron in which they are imbedded. This, he was informed, was the most laborious occupation in the whole factory, requiring a most powerful arm to wield the heavy hammer, whose blows were necessary to ensure the union of the two metals; and involving also constant exposure to a very high temperature. The day was sultry and oppressive; and the additional heat of the forge was, to his own feelings, almost unbearable. But he stood awhile watching this gigantic labourer, the girth of whose chest seemed twice that of any ordinary man, whilst, naked to the waist, and with the perspiration streaming down his head and body, he dealt the rapid and skilful blows of his ponderous hammer upon the heated mass. At the first pause, the Author asked him (from mere curiosity, for teetotalism was then scarcely talked of) what liquor he drank; and he replied by pointing to a whole row of *ginger-beer* bottles behind him, the contents of one of which he imbibed every ten or fifteen minutes. He stated, upon further questioning, that he found it quite impossible to drink alcoholic liquors whilst at his work: their effect being to diminish his strength to such a degree as to render him unfit for it.

137. There is probably no kind of labour more trying, both as to its severity and continuance, and as to the circumstances under which it is prosecuted, than that of the Ballasters and Coal-whippers on the Thames. It has been long notorious that these men are enormous consumers of fermented liquors, both spirits and porter; and although it has been known that their drinking habits have been partly engendered by the system under which they have worked, yet there has been a general belief that it would be impossible for them to get through their toil without such artificial stimulation. Some very remarkable details of their condition have been made public, through the inquiries of Mr. H. Mayhew, who was employed as a "Commissioner" by the "Morning Chronicle" newspaper, in which his reports were published, and he found that many of the coal-whippers have become Total Abstainers; while others who adopted the Abstinence system for a time, have returned to their former habits. It appears from the statements of such of those men as still have recourse to Alcoholic stimulants, that the principal part of the liquor consumed by them is taken in the evening, after the day's toil is over, as they "could not stand it" whilst at work;—a fact which remarkably confirms the doctrine previously laid down (§ 132) as to the impairment which the presence of Alcohol in the blood will produce in its powers as the exciting fluid (so to speak) of the nervo-muscular battery. The men who have steadily practised Total Abstinence for some years, agree in stating that they could do more work in the time on the Total Abstinence system, than on their previous plan; that they did it with more ease and comfort to themselves; and that they felt less subsequent fatigue. These men all attributed the preservation of their strength to the sustaining power of good *food;* and the failure of some of those, who, having tried the Total Abstinence system for a time, have gone back to their former habits, on the ground that they could not bear the change, is unquestionably attributable to their not having had recourse to proper sustenance, in the place of the Alcoholic stimulants to which they had been accustomed.

138. There are few occupations more trying to the strength than Harvest-work, both on account of the continuity of the

exertion required, and the heat which usually prevails at the time of its performance. Yet there is ample testimony that those who go through it upon the Abstinence principle are better able to sustain it, than those who endeavour to support their strength upon fermented liquors; and that, if an adequate supply of nutritious food be provided for them, the former will even *increase* in weight whilst going through this severe toil.

A very circumstantial account of a trial of this kind has been published by Mr Josiah Hunt, a well-known agriculturist in Gloucestershire:* who, having let eighty acres of grass, to mow, harvest, and stack, to seven Abstainers, records the following result:—

"The whole of the work, without the least exception, was performed more to my satisfaction than ever was the case before. During the progress of it, they gave abundant proof that they were equal to as much work as any seven men in the neighbourhood; and also to as much as they themselves had been equal to at any time whilst taking intoxicating drinks. They were not picked men; four of them about the respective ages of 55, 41, 30, and 29, having worked for me for several years; the others, aged 41, 30, and 20, having been engaged at various times in the spring, without any intention of retaining them during the summer; and that they were not of more than average strength may be inferred from the fact, that I was told before they began,—'We know very well how your experiment will end; for there are but two men out of the seven that can do a day's work; they will be knocked-up before they have mowed two hours.' At the end of the first day's mowing it was found, however, that they had done more than any other men in the neighbourhood; and as they thus proceeded without being knocked-up, the tables were turned, and I was told then that they performed so well in consequence of their good living." This 'good living' was simply the result of the expenditure of the money-value of the cider usually allowed, upon solid food, with tea and cocoa for drink.

Statements of the same nature have been furnished to the Author by farmers and labourers in the county of Cornwall, where the Abstinence system is more extensively practised than in any other county in England; it being the general custom, in many parts, to get in the harvest without any allowance of fermented liquors to the men engaged in it, some other equivalent being of course given. For the last fourteen years a public harvest-home has been celebrated at Bodmin, and masters and men have testified to great and special benefits enjoyed by the practice of Teetotalism in the harvest-field. Where an improved diet has been substituted, in the Bodmin district, for alcoholic drinks, it has been found that the labourers, like those employed by Mr. Hunt,

* Bristol "Temperance Herald," September, 1841.

increased in weight during the severe labour of the harvest, as much as five pounds a man, on the average.

139. The following example is of peculiar value, as showing the comparative effects of the systems of *moderate drinking* and of *total abstinence*, upon the same set of individuals, during a period of very severe and prolonged exertion: and it is the more satisfactory, as the testimony which it bears to the peculiar value of the latter, under such circumstances, was given by an individual who, though moderate in his own habits, was by no means a disciple of the Total Abstinence system.

The Author met, some years since, with a gentleman who had recently commanded a vessel during a voyage from New South Wales to England, under the following peculiar circumstances.—Soon after passing the Cape of Good Hope, the ship sprang so bad a leak, as to require the continued labour, not merely of the crew, but of the officers and passengers, to keep her afloat by the use of the pumps during the remainder of her voyage, a period of nearly three months. At first, the men were greatly fatigued at the termination of their "spell" at the pumps; and after drinking their allowance of grog, would "turn-in" without taking a proper supply of nourishment. The consequence was, that their vigour was decidedly diminishing, and their feeling of fatigue of course increasing, as our physiological knowledge would lead us to expect. By direction of their Commander, coffee and cocoa were substituted for the grog, a hot "mess" of these beverages being provided with the biscuit and meat at the conclusion of every watch. It was then found that the men felt inclined for a good meal of the latter, when the more direct but less effective refreshment of alcoholic liquor was withdrawn: their vigour returned; their fatigue diminished; and after twelve weeks of incessant and severe labour (with no interval longer than four hours), the ship was brought into port with all on board of her in as good condition as ever they were in their lives.

140. Numerous examples might be cited, of *comparative trials* between two sets of labourers, as nearly as possible alike in other respects, but the one practising Total Abstinence, whilst the other has relied upon the assistance of Alcoholic liquors. So far as the writer is aware, all these contests have given results in favour of the Abstinence system, when the period of the experiment has been sufficiently protracted to give its merits a fair trial; and although it may be asserted that such results are one-sided, as having been made known to the public by the professed advocates of a *system*, yet, considering the very large interests involved

in the maintenance of the existing state of things in regard to the use of fermented liquors, it might be reasonably expected that their upholders would make known to the world any results of an opposite description, had they really occurred.

The following statement, furnished to the writer by a gentleman at Uxbridge, has the advantage of being the comparative return of the *regular labour* of a whole year, performed by two sets of men, the one working on the "abstinent," the other on the "moderate" system, but not pitted against each other in a contest for victory. It relates to brick-making, which is commonly accounted one of the most laborious of all out-door employments.—"Out of upwards of twenty-three millions of bricks made in 1841, by the largest maker in the neighbourhood, the average per man made by the beer-drinkers in the season was 760,260; whilst the average for the teetotallers was 795,400—which is 35,131 in favour of the latter. The highest number made by a beer-drinker was 880,000; the highest number made by a teetotaller was 890,000—leaving 10,000 in favour of the teetotaller. The lowest number made by a beer-drinker was 659,500; the lowest number made by a teetotaller was 746,000—leaving 87,009 in favour of the teetotaller. Satisfactory as the account appears, I believe it would have been much more so, if the teetotallers could have obtained the whole 'gang' of abstainers, as they were very frequently hindered by the drinking of some of the gang; and when the order is thus broken, the work cannot go on."

141. The experience of *large bodies* of men, however, which becomes matter of public notoriety, is in many respects preferable, as demonstrating (to say the least) the perfect compatibility of abstinence from Alcoholic liquors with the highest degree of physical vigour, and with the greatest power of endurance of bodily labour.

Thus, almost every traveller who has visited Constantinople, has been struck with the remarkable muscular power of the men engaged in the laborious out-door employments of that city. Mr. W. Fairbairn, an eminent machine-maker at Manchester, remarked that "the boatmen or rowers to the caïques, who are perhaps the finest rowers in the world, drink nothing but water; and they drink profusely during the hot months of summer. The boatmen and water-carriers of Constantinople are decidedly, in my opinion, the finest men in Europe, as regards their physical development; and they are all water-drinkers."* And several other observers bear testimony to the extraordinary strength of the porters of Constantinople, who are accustomed to carry loads far heavier than English porters would undertake, even under the stimulus of Alcoholic beverages; yet these Turkish porters never drink anything stronger than coffee.

* Sanitary Report, 1840, p. 252.

The following statement in regard to the relative condition of similar classes of operatives, in three localities far removed from each other, before and after the adoption of the Total Abstinence system, shows how completely the doctrine of the reputedly "universal experience," in regard to the support afforded by Alcoholic liquors to the laborious artisan, is negatived by the results of a change of habit, even when forced upon those most unwilling to adopt it.

"A remarkable and most satisfactory instance," says Mr. Tremenhere (one of the Commissioners employed by Government to report on the condition of the Mining population), "of a successful attempt to put a check upon the indulgence in ardent spirits, has occurred in the iron-works of Messrs. Houldsworth, of Coltness, employing about eight hundred colliers, miners, furnace-men, &c. Much loss and annoyance had frequently been occasioned by the negligent or wilful misconduct of workmen under the influence of this habit; and the Messrs. Houldsworth, having in vain endeavoured to put an end to it by persuasion and advice, resolved to do what they could by removing the temptation. They accordingly, about three years ago, forbade the sale of spirits at the store, and at the inn at their works, and ordered that the furnace-men should not be allowed to drink spirits during their hours of labour. These men had been accustomed to drink four or five glasses of whiskey during each 'shift,' in addition to what they might choose to drink at their own homes. They remonstrated strongly, and affirmed that it was impossible for them to do their work without this quantity of whiskey. They were not long, however, before they found their error; they now drink nothing but water during their work, and tea and coffee at their meals; what they spent on whiskey they now spend in wholesome or nutritious food; they allow that they *do their work better*, and that the change has been a great blessing to themselves and their families; and that it is the best thing that ever happened to them. I was afterwards informed that among the colliers and miners there was a marked improvement from the same cause."

In the copper-mines of Knockmahon, as we are informed by their manager, Captain Petherick, more than one thousand persons are daily employed, of whom eight hundred have taken the Total Abstinence pledge. Since doing so, the value of their productive industry has increased by nearly £5,000 per annum; and not only are they able to put forth more exertion, but their work is done better, and with less fatigue to themselves. Besides this, they save at least £6,000 every year, which had been previously expended in the purchase of Alcoholic liquors.

A similar change, made at the Varteg Iron-works, when under the management of the late Mr. G. Kenrick, was attended with corresponding results; more work being done in the succeeding six months, than had been ever accomplished within a similar period; and this being performed with more comfort to the men themselves, and with more satisfaction to their employers.

142. The experience of an army on a march, or when engaged in some peculiarly laborious duties, has occasionally afforded the opportunity of testing the power of prolonged exertion without the supposed assistance derived from the use of Alcoholic liquors; the abstinence having been in some instances voluntary, whilst in others; it was compulsory, and the results in both cases being fully confirmatory of the principles here laid down. Two striking examples of this kind will be mentioned under the head of "Endurance of Heat," (§ 177), since it was the high temperature, rather than the actual amount of muscular exertion, which was the principal source of fatigue in those cases. The following, however, are deserving of special notice in this place:—

During Sir John Moore's retreat to Corunna, the army was found to *improve* in health and vigour, as soon as the usual allowance of spirits was unattainable. This fact is the more remarkable, as the circumstances under which this march was performed must have been peculiarly depressing to the feelings of the men, and could not but have operated unfavourably (according to the ordinary experience of retreating armies) upon their physical powers.

In the defence of Jellalabad by Sir Robert Sale, in 1841-2, the European troops, besides having insufficient rations, were without their allowance of spirits. "I will not mention this last as a privation," writes Sir Robert Sale, in his official despatch, "because I verily believe that this circumstance and constant employment have contributed to keep them in the highest health, and the most remarkable state of discipline." To Sir Robert Sale's testimony may be added that of a private of his brigade, who thus writes:—"From the 12th of November to the 18th of April, our men had no liquor; they worked six hours a-day for a long time, and almost every day, besides three hours' digging trenches, building walls, &c.; add to this, being on duty six or seven nights out of eight, with short rations. With all this hardship we were very healthy, and not a non-commissioned officer was reduced during the time, nor was a man tried by court-martial. These facts are so striking, that officers and men acknowledged that we were much better off without the ration of ardent spirits than we could possibly have been with them."*

143. The experience of whole nations, previous to the introduction of fermented liquors among them, is equally in favour of the assertion, that prolonged and severe muscular exertion may be at least as well borne without their assistance as with it. Where, for example, shall we meet with greater

* Scottish Temperance Journal.

endurance of toil than was displayed by the North American Indians in "following a trail," before their race became deteriorated by European vices? Or where can we now find a greater power of sustaining exertion, than is shown by the Guachos of the South American Pampas, whose food is beef, and whose only drink is water? The following is the account of the habits of the latter, given by Sir Francis Head: *—

"As the constant *food of the Gaucho is beef and water*, his constitution is so strong that he is able to endure great fatigue; and the distances he will ride, and the number of hours he will remain on horseback, would hardly be credited." As an evidence that this is not a random guess, Sir F. Head informs us that he resorted to this diet himself, and in a short time became as untirable as the Gauchos themselves, galloping from sunrise to sunset in his journeys across the Pampas, at such a rate that none but a native could keep pace with him. He says, "when I first crossed the Pampas, I went with a carriage, and although I had been accustomed to riding all my life, I could not at all ride with the peons (drivers of the carriage), and after galloping five or six hours, was obliged to get into the carriage; *but after I had been riding for three or four months, and had lived upon beef and water, I found myself in a condition which I can only describe by saying, that I felt no exertion could kill me.* Although I constantly arrived so completely exhausted that I could not speak, yet a few hours' sleep on my saddle on the ground always so completely restored me, that for a week I could daily be upon my horse before sunrise, could ride till two or three hours after sunset, and have really tired out ten or twelve horses. This will explain the immense distances which people in South America are said to ride, *which I am confident could only be done on beef and water.*"

The following evidence was given by Mr. J. S. Buckingham, in his evidence before the Parliamentary Committee for the Suppression of Intemperance in 1834.—"He once commanded a frigate in the service of the Imaum of Muscat, whose crew consisted of three hundred men, all Arabians, who never tasted any intoxicating liquor; and they were the most athletic and elegantly-formed men he had ever seen. He has further remarked, that when he was at Calcutta, he witnessed a trial of strength between a number of men who came down from the Himalayan mountains, and the most powerful Europeans who could be selected from the English grenadiers and the vessels in the harbour; and that in lifting weights, hurling the discus, vaulting, running, and wrestling, each of these Indians was found equal to one and three-quarters of the Englishmen; and yet not one of them had ever tasted any liquor stronger than water." During his extensive travels among

* Rough Notes of Journeys across the Pampas.

the Mahomedan populations of Syria, Mesopotamia, Persia, Egypt, &c., Mr. B. was struck with their generally fine development, and their remarkable amount of muscular vigour, notwithstanding their universal abstinence from Alcoholic liquors.

144. The question, it may again be remarked in conclusion, is not to be decided by the amount of strength which may be put forth at a single effort. It may be freely admitted that, when the body is exhausted by fatigue, an Alcoholic stimulus, which excites the Nervous system to increased exertion, may impart a *temporary* strength, which shall enable the next effort to be successful in doing that which could not have been accomplished without it. But the power of *continued* exertion is thus impaired, instead of being sustained; and those who have habitual recourse to this stimulus, are really diminishing their physical power in the long run. This must be most assuredly the case, when they allow it to take the place of the solid aliment, which their nervous and muscular systems require for their regeneration.

2. Endurance of Mental Exertion.

145. All that has been said of the influence of Alcoholic liquors on the development and sustentation of Physical force, will equally apply to Mental power; since, whatever may be our views as to the relation between Mind and Matter, it is not now questioned by any Physiologist, that the Brain is the *instrument* by which all mental power is exercised in Man's present state of existence, and that the continued development of this power is consequently dependent upon those conditions which are favourable to the maintenance of the functional activity of the Nervous system in general (§ 129). That the use of Alcoholic stimulants, however, is attended in most persons with a *temporary* excitation of mental activity,—lighting up the scintillations of genius into a brilliant flame, or assisting in the prolongation of mental effort when the powers of the nervous system would otherwise be exhausted,—may be freely conceded; and it is upon such evidence as this that the common idea is based, that it *supports* the system under the endurance of mental labour. This idea, however, is probably as erroneous as the no less prevalent fancy of re-

garding Alcoholic liquors as capable of increasing the power of physical exertion. No physiological fact is better established, than that of the depression of the mental energy consequent upon the undue excitement of it, by whatever causes such excitement may have been occasioned; so that the rapid and brilliant flow of thought which may have been called forth by Alcoholic stimulants, gives place, usually after a few hours, to the opposite state of languor and despondency.

146. The influence of Alcoholic stimulants seems to be chiefly exerted in exciting the activity of the *creating* and *combining* powers; such as give rise to poetical imaginations, to artistic conceptions, or to the sallies of wit or humour. It is not to be wondered-at, then, that men possessing such powers, should have recourse to Alcoholic stimulants as a means of procuring a temporary exaltation of them; and of escaping from the fits of depression to which most persons are subject, in whom the imaginative and emotional tendencies are predominant. Nor is it to be denied, that many of those mental productions which are most strongly marked by the inspiration of genius, have been thrown off under the stimulating influence of alcoholic liquors. But, on the other hand, it cannot be doubted that the depression consequent upon the high degree of mental excitement which is thus produced, is peculiarly great in such individuals, completely destroying for a time the power of mental effort; and hence it does not at all follow that either the authors of the productions in question, or the world at large, have really benefited thereby. Moreover, it is the testimony of general experience, that where men of genius have habitually had recourse to Alcoholic stimulants for the excitement of their powers, they have died at an early age, as if in consequence of the premature exhaustion of their nervous energy; Mozart, Burns, and Byron may be cited as remarkable examples of this result. Hence, although their light may have burned with a brighter glow, like a combustible substance in an atmosphere of oxygen, the consumption of material is more rapid; and though it would perhaps have shone with a soberer lustre without such stimulation, it would probably have been steadier and less prematurely quenched.

147. We do not usually find that the men most distinguished for that combination of intellectual powers which is known as *talent*, are disposed to make such use of Alcoholic stimulants for the purpose of augmenting their mental powers; for that *spontaneous* or automatic activity of the mind itself, which it is the tendency of Alcohol to excite, is not favourable to the exercise of the observing and purely reasoning faculties, its direct tendency being to weaken the controlling and directing power of the *will*. Thus it renders the individual who has recourse to them, the slave instead of being the master of his impulses; and prevents him from determinately devoting his attention to any subject on which he may desire to keep his mind fixed, either in the way of outward observation or of inward reflection. Of this we have a remarkable illustration in the habits of practised gamblers; who, when about to engage in contests requiring the keenest observation and the most sagacious calculations, and involving an important stake, always "keep themselves cool," either by entire abstinence from fermented liquors, or by the use of those of the weakest kind in very small quantities. And we find that the greatest part of that intellectual labour which has most extended the domain of human knowledge, has been performed by men of remarkable sobriety of habit, many of them having been constant water-drinkers. Thus, in regard to LOCKE, whose long life was devoted to constant intellectual labour, and who appears, independently of his eminence in his special objects of pursuit, to have been one of the best-informed men of his time, the following very explicit and remarkable testimony is borne by one who knew him well. "His diet was the same as other people's, except that he usually drank nothing but water; and he thought that his abstinence in this respect had preserved his life so long, although his constitution was so weak." *

Having been, for several years past, himself performing an amount of steady mental labour, which to most persons would appear excessive, the Author may be allowed to refer to his own experience, which is altogether in favour of Total Abstinence from Alcoholic liquors, as a means of sustaining the power of performing it.

The following is the testimony of Mr. S. C. Hall, a well-known author,

* Life by Lord King, vol. ii. p. 60.

and editor of the "Art-Journal:"—"He lived by the labour of his brain; and he could testify that since he had become a Teetotaller, he had an increase of intellectual powers, so that what he sent out to the public never came trickling through a disturbed and disordered medium. And as to *endurance of fatigue*, he was able to work three times longer than ever he could while he indulged, *even moderately*, in the use of strong drinks. He was better in body, in mind, in home, in every comfort; and he felt proud, therefore, of the pledge he had taken to abide by the practice of entire abstinence."

To this we may add the following emphatic statement of his personal experience, given by Mr. Edward Baines, the Editor of the "Leeds Mercury":—"I feel it my duty, having abstained from intoxicating liquors for fifteen years, to state that during that whole time I have enjoyed good and vigorous health, with scarcely a day's interruption; that I have never for an hour felt any need of such liquors; and that I believe I have done more work, have had better spirits, have eaten my food with greater relish, and have slept more tranquilly, than I should have done if I had habitually taken wine or beer. * * Within fifteen years of life one passes through various circumstances, which would be likely to try the merits of any regimen. But I have never felt as if strong drink would help me in any of those circumstances;—certainly not in protracted study; as certainly not in the prolonged and exciting public meeting; not in active business, however pressing; not in travelling, by night or by day; not in pedestrian rambles on the mountains of Cumberland or Wales; not in the cold of winter; not in the heat of summer; not in the raw damp of intermediate seasons; not in the morning, not at noon, nor yet at night; not in anxiety and trouble; not in joy and social intercourse. I need it in none of these circumstances; it would do me mischief in many. It might cloud my intellect, or excite my brain, or disorder my stomach, or cause local inflammation more or less serious. There are those who think that wine or beer is needful whenever they feel fatigued or exhausted. But surely Nature provides her own restorative at a much easier and cheaper rate. He who is tired should rest; he who is weary should sleep; he who is exhausted should take wholesome food or innocent beverages; he who is closely confined should take air and exercise. I repeat that in my own case Alcoholic drinks are never necessary, and would never do me good."

148. Even if it were proved, however, that a certain amount of mental labour might be performed with more facility in a limited time, under the moderate use of Alcoholic stimulants, than without such aid, it would still seem probable that we should, on the whole, rather lose than gain by their employment. For, if they cannot afford *pabulum* for the formation of Nervous matter, and if their influence is exerted rather in producing its disintegration than its growth,—its *de*struction rather than its *con*struction,—it follows

that every excess of exertion performed under their influence must be followed by a correspondingly long period of incapacity, during which the regenerating processes have to be performed, so as again to fit the brain for the discharge of its duties; and if it should be forced into activity before this renovation has been duly performed, the amount of stimulus required to bring it up to the working-point will be greater, and all the consequent evils increased. These theoretical predictions are, it is believed, in full accordance with what observation teaches, with respect to the results of reliance upon Alcoholic stimulants for support during mental labour; although, for obvious reasons, it is not possible to obtain the same pointed and decisive evidence on this topic, as in regard to the endurance of physical exertion, or of extremes of temperature.

149. There is a large class of individuals, habitually subjected to a very severe form of exertion, requiring great mental and bodily effort at the same time, and frequently under conditions of a very unfavourable nature;—these are Ministers of Religion, Lecturers, and other Public Speakers. Among such, there has been, and still is, a very prevalent idea, that the moderate use of Alcoholic stimulants enables them to get through their work better, and refreshes them when suffering under the fatigue and exhaustion induced by their labour. In considering what Science and Experience have to say on this matter, we shall first inquire into the sources of the peculiar fatigue to which such individuals are liable.—In the first place, the *extempore* preacher or speaker is in a state of extreme *mental tension* during the whole of his address; his whole intellectual energy is concentrated upon it, and to this is frequently added a considerable degree of emotional excitement. The case is not so strong with regard to him who reads his sermon or lecture; but even this requires that constant direction of the attention, without even a momentary intermission, which exerts a powerful strain upon the mental powers. In addition to this, the speaker has to make a great physical exertion in addressing a large audience; and this, of course, will be the more considerable, in proportion as he becomes warmed with his subject, and his utterance and gesture manifest the earnestness of his feeling. Now all this occasions, on the

principles already stated (§ 129), a considerable demand for oxygen; and, as a consequence of the using-up of a considerable amount of muscular and nervous tissue, there is an unusual quantity of refuse matter thrown into the circulating current, of which the blood requires to be purified.

150. Now every employment of the Respiratory apparatus in the production of Voice, requires a modification of the ordinary movements of respiration; and any person who watches a public speaker, will perceive that he renews his breath *far less frequently* than does a person who is breathing tranquilly, and that, for the delivery of his sentences without pauses which the sense does not require, he continually *empties his chest* far more completely than it is natural for him to do. Thus, whilst there is an unusual demand for the introduction of oxygen, and for the elimination of the products of combustion, there is at the same time an unusual limitation to the activity of these two processes; and there is hence strong reason to conclude, that the peculiar fatigue experienced after efforts of this kind, is due, not so much to the consumption of nervous and muscular tissue, as to the contamination of the blood by a large amount of unoxidized excrementitious matter, waiting to be eliminated by the combustive process (§ 7). There are two circumstances which add great weight to this idea. In the first place, it is well known to every one who has had much experience of this kind, that the amount of fatigue is immensely increased, when the effort is made in the heated and vitiated atmosphere of a crowded, ill-ventilated building, which causes the respiratory process to be still less perfectly performed. And, secondly, it has been found by many individuals to whom preaching or speaking was a peculiar exertion, and who feared that they must relinquish it altogether, that their uneasiness was greatly relieved by strict attention to the respiration during the continuance of their vocal efforts, the breath being drawn more frequently than is usual whilst speaking or reading, and the chest never being emptied.

151. Now all that has been already stated of the absolute inutility and positively injurious effects of Alcoholic beverages, when a large amount of mental or physical exertion has to be sustained, applies with peculiar force to the case

of the preacher, lecturer, or speaker. Whatever may be the *temporary* support which they may afford, they can do nothing towards the renovation of the nervous and muscular tissue which has been consumed, nor can they help to free the blood from the products of their decomposition, nor can they supply the oxygen of which there is such urgent need; on the contrary, by setting up a demand for oxygen *for themselves*, they will still further retard the purification of the blood from the refuse matter with which it is charged; and however comforting they may be felt to be *at the time*, it might be anticipated upon scientific grounds that the period of fatigue and depression will be *really prolonged* under their use, and that an interval of repose will be less effectual than it ought to be, in restoring the energy which has been consumed;—in fact, that the feeling of exhaustion will be only *postponed*, and not *averted*.

152. Now there is no point on which the teachings of *experience* are more completely in harmony with the predictions of science, than they are with regard to this;—that the habitual resort to Alcoholic liquors for the purpose of sustaining the mental and physical powers, when overtasked in preaching, lecturing, or public speaking, is so far from being of any real service, that it actually *retards recovery*; the minister feeling far more 'Mondayish' after his Sunday's duty, when he has comforted himself at its close with a glass or two of wine, or a tumbler of spirits-and-water, than when he has made use of some unstimulating beverage; and the public speaker being far more prepared for a repetition of his exertions on the succeeding day, when he has abstained from the delusive support which Alcoholic liquors *seem* to afford.

The Author cannot give on this subject any *comparative* experience of his own; but he may mention that he has frequently lectured (extempore) to large audiences every evening in a week, after spending the whole day in mental labour,—that he has often lectured twice in the same day, and has once given three public lectures in one day,—and that he has always found himself (when in his ordinary health) fully able to go through these duties, without any stronger beverage than tea or coffee.

A few years ago, the Author, when travelling in Scotland, met with a Highland Minister, who, having been induced to think seriously on this

subject, by the perusal of his "Temperance and Teetotalism," [an article reprinted from the "British and Foreign Medical Review," of which fifty thousand copies have been disposed of by the Scottish Temperance League], had been *gradually* changing his habits, from Modederation to Total Abstinence, with a decided improvement in his general health and power of exertion. The last thing which he had relinquished was his tumbler of whisky-toddy on Sunday evenings, which seemed to afford him a great refreshment after the fatigues of two long services, into which he was accustomed to throw his utmost energy. He gave up this at first merely as an experiment, and went to bed on Sunday nights in by no means as comfortable a state as he had been used to do; but he soon found that he rose *so much fresher* on Monday mornings, and was so much fitter for mental and bodily exertion on that day, that he continued his Abstinent practice from a conviction of its decided benefit.

The following are selected from the numerous published testimonies bearing on this point; and it is hoped that the confirmation which they afford to the statements already made, will fully suffice to convince every unprejudiced person of their truth. At any rate, no one has any right to deny them, until he has given *a fair trial* to the Abstinence system.

The following is the very striking testimony of the Rev. B. Taylor, a Missionary in South Africa, dated July 20, 1852:—"I have been an abstainer from all kinds of intoxicating drinks for upwards of eleven years; and at no period have my duties been either few or light. I have never had less than three services every Sabbath, and four during the week, besides frequent visits from house to house, and a variety of duties not falling under any regular category. But I have for months consecutively had five services on the Sabbath, and as many during the week, preaching in three different languages, and visiting as many different people. And at different periods of these eleven years, I have been subjected to what might possibly be considered rather severe privations; our diet being for many weeks, and in some years many months, composed of dry bread and rice, or pumpkins, with tea or coffee without milk. I say *our*, because in all my labours and privations my wife has had her full share, in the latter especially, since in the worst times she has more than once had an infant dependent upon her for nourishment, and yet without resorting to any of those drinks usually considered necessary to females in similar circumstances. For myself it is my firm conviction that had I been accustomed to take spirits, wine, or beer, I could not have continued my labours, at least not with the ease nor to the extent that I have been enabled to do. My general health and spirits are as good as when I first adopted "teetotal" principles. I cannot say I am as strong as I was at that time; but no one, I suppose, imagines that total abstinence is to render the human frame altogether proof against the wear and tear of years of toil. It is comparison with which we have to deal, and I am not incapable of contrasting the effects of entire abstinence with those produced by moderate use of wine and porter. My missionary life has extended beyond seventeen years, and I can therefore tell which is more favourable to health and comfort—

abstinence or mere moderation. I am not, therefore, a mere theorist. I have also had much, very much reason to be thankful for the good effects seen in others from the practice of total abstinence, which by God's grace I have been enabled to maintain. I can scarcely conceive, indeed, how a missionary can get on without it. It gives him an argument and a moral power which nothing can gainsay. Without it his best efforts must often be paralyzed."

The Rev. — Hatchard (Vicar of Plymouth), at a Temperance meeting held in that town, observed as follows:—"You all know that my work on the Sabbath-day is very hard, and I used to think that I was entitled to something good after the labours of the day, and generally took a stiff glass of brandy-and-water. I did this, as I thought, to strengthen me, but I invariably passed a restless night, was always Mondayish, and felt unfit for anything; but since I have given up the brandy-and-water, I feel as well on Monday morning as I did on Saturday night."

Extract of a speech of the Rev. J. Sherman (of Surrey Chapel, London).—"It is now two years and five months since I abstained wholly from intoxicating liquor; and during that entire period, excepting just at first during the seasoning, I have enjoyed better health, and found myself more able to perform my duties. Those duties are not light, for on an average, I have eight services a-week. Sometimes I have preached and spoken ten, twelve, fourteen, and sixteen times in the week, but the average has been eight, and I can most conscientiously say, that I go through these labours with more personal comfort than when I took a small quantity of intoxicating drink. Thus, so far as my own experience goes, abstinence is good.'

Few men have gone through more exertion as public speakers, than did Mr. Cobden and his associates at the time of the Anti-Corn-Law agitation. The following is his very emphatic testimony on this subject:—"No one has more faith than I have in the truth of the Teetotal doctrine, both in a physical and moral point of view. I have acted upon the principle that fermented and distilled drinks are useless for sustaining our strength; for the more work I have had to do, the more I have resorted to the pump and the teapot." Addressing a public meeting at Bradford, after adverting to the fact that Colonel Thompson and Mr. Brotherton, both of them teetotallers, were the most constant in their attendance of all the members of the House of Commons, he continued:—"From what I have seen in the House, I must say that I have the belief that the men who are the most temperate, are the men who bear the fatigue of that House the best. I remember on one occasion that Colonel Thompson, Mr. Bright, and myself, went on an agitation-tour, during the height of the League agitation, into Scotland. We separated, and went through Scotland, lecturing every night, and holding public meetings—sometimes two meetings a-day. We rendezvoused together on coming back; and on comparing notes, we found that, during all our tour in Scotland, not one of us had paid a farthing for fermented or intoxicating drinks of any kind.'

3. Endurance of extreme and continued Cold.

153. The power of Alcoholic liquors to enable the body to resist the depressing influence of external Cold, is usually regarded as the best-established of all its attributes; and this, not merely in the estimation of the uninformed public, but in the opinion of some who have scientifically considered the question. This is by no means surprising. The genial warmth which is experienced for a time, when a glass of spirits is taken on a cold day, appears to afford unmistakeable evidence of its heat-producing power; and the chemical properties of Alcohol would seem to indicate, that, under such circumstances, it does not merely act as a stimulant, increasing the activity of the circulation, and augmenting the nervous energy—but that it also affords the material for that combustive process, by which the heat of the body is sustained, in a form peculiarly suitable for rapid and energetic appropriation to this purpose. The authority of Liebig is continually quoted in support of this view; but more has been built upon his statements than they legitimately support. For his arguments are rather directed to prove that Alcohol cannot become a *pabulum* for the tissues, and that its use, therefore, must be limited to the maintenance of the temperature of the body by the combustive process, than to show that it is superior to other materials, to whose employment, as they exert no stimulating influence, the objection raised against Alcohol cannot apply.—That we may place this question upon its proper basis, it will be necessary to consider the circumstances under which the combustive process is usually carried on.

154. That the maintenance of animal heat is chiefly, at least, dependent upon the union of the carbon and hydrogen of certain materials contained in the blood, with oxygen taken in by the lungs,—and that the "non-azotized" ingredients* of the food are specially appropriated to this purpose, —are positions in which there is now such a general agreement amongst Physiologists, that they may be assumed as a basis for our further inquiries. The non-azotized ingredients of ordinary food may be grouped under two heads—the

* Those, namely, which are composed of oxygen, hydrogen, and carbon only; no azote or nitrogen entering into their composition.

Saccharine and the *Oleaginous;* the former including all those farinaceous matters which can be converted into sugar; and the latter consisting of oil and fat in every form. The former may be considered as *hydrates of carbon;* their proportionals of oxygen and hydrogen being such as to form water; so that in combustion they will only consume as much oxygen, as will convert their carbon into carbonic acid. On the other hand, the proportion of oxygen in the latter is comparatively small; so that in combustion they require as much as will not only convert their carbon into carbonic acid, but will also unite with that part of the hydrogen for which no equivalent of oxygen previously existed in the compound. Hence, according to the estimate of Liebig, the heating power of fat is, to that of starch or sugar, as about 2½ to 1; so that 100 parts of fat would answer the same purpose in maintaining the heat of the body, as 240 parts of starch or 219 parts of sugar. Now, pure Alcohol approaches much more closely to the oleaginous than to the saccharine class, both in its chemical relations, and in its power of generating heat by the combustive process; and hence it is of great use to the chemist, who finds that a spirit-lamp gives even more heat than an oil-lamp. But though such is the heating power of *pure* Alcohol, the heating power of liquors in which the Alcohol is more or less diluted with water, is far less; for, according to the estimate of Liebig, as many as 266 parts of *spirit,* containing 50 per cent. of absolute Alcohol (which is the strength of ordinary brandy, rum, gin, or whiskey), are required to generate the same amount of heat as 100 parts of *fat* would serve to produce; so that, weight for weight, the heat-producing power of 'proof' spirit, considered simply as a chemical agent, is actually less than that of starch or sugar. But the human body is not simply a lamp or a furnace; and the power of Alcoholic liquors to assist it in sustaining cold, must be estimated by other considerations than those which have reference merely to its value as a combustive material. It is, in fact, because the influence of Alcohol upon the *vital* functions is too much disregarded, and its share in the mere *chemical* process of combustion too exclusively kept in view, that notions are entertained of its value, which are contradicted by lengthened

and extended experience. This will be best understood, if we examine, in the first instance, into the circumstances under which other non-azotized substances, taken in as food, are made to contribute to the maintenance of heat.

155. Of such substances, a certain amount is usually circulating in the blood. All analyses indicate the existence of *fatty* matter in that fluid; their proportion, however, varies considerably, being greatest soon after a full meal of which oleaginous matters have formed a part. The presence of *sugar*, also, in that part of the circulating current which passes between the alimentary canal and the lungs, may now be considered an established fact; and it appears from the researches of M. Cl. Bernard, that both sugar and fat may be generated by the liver from other materials supplied by the blood, when neither are present *as such* in the food. Part of this production takes place at the expense of such components of the food as can be readily transformed into sugar; but there is strong reason to believe that such of the refuse-matters of the system as can be applied to the maintenance of the combustive process (§ 7), are made to assume one of these forms before being thus employed.—Hence we see that oily or saccharine substances, in whatever way they may come to be present in the current of blood proceeding to the lungs, constitute the proper *pabulum* or fuel, at the expense of which the combustive process is maintained, and the heat of the body thus kept up to its normal standard.

156. In this manner, then, a great part of the Heat-producing materials are usually supplied to the system from meal to meal, in a state which renders them disposed for elimination from the blood within a short time after their admission into it; and the power of sustaining heat exists in its greatest vigour, only while some of them remain unconsumed. This inference is confirmed by ordinary experience; for every one knows how much more severely cold is felt after a fast of some hours' duration, than after a full meal.*

157. Now, when Fatty matters have been introduced in

* These views are remarkably borne out by the statements regarding the condition of the blood shortly after a meal, contained in the paper of Drs. Buchanan and R. D. Thomson in the "Medical Gazette," Oct. 10th, 1845.

greater quantity than the immediate wants of the system require, they do not produce any disturbance or derangement of the vital functions, in a healthy person at least; but the superfluity is withdrawn from the circulating current, by the production of adipose tissue (or ordinary *fat*) which stores it up for future use. And the same takes place with saccharine matter, which is not at once consumed; this being converted into oleaginous compounds within the system, which are then appropriated to the formation of fat.* When, on the other hand, the supply is not equivalent to the consumption required for the maintenance of the heat of the body, the fatty matters which are among the normal constituents of the blood are first drawn upon; and as the proportion of these is diminished, it is supplied from the contents of the cells of adipose tissue. In this manner the animal temperature is kept up nearly to its usual standard, even in spite of the total deprivation of food, so long as unconsumed fatty matter remains in the body; but death then speedily takes place in consequence of the cooling of the body, unless the temperature be sustained by external warmth.

158. We are now prepared, then, to inquire into the question, how far Alcohol may be advantageously employed habitually as a heat-producing material; and whether there are any peculiar or extraordinary circumstances, under which it is to be preferred to others. And as one means of arriving at the truth on this point, we must call to mind the influence which the introduction of Alcohol into the blood exerts upon the combustive process.

159. This has been already shown to be, so far as the *carbonaceous* portion of the combustible materials are concerned, an influence of retardation rather than of acceleration (§ 8); and although it may be very possible that, as suggested by Liebig, the increased formation of water, which will occur when Alcohol is the combustive material, compensates for the diminution in the amount of carbonic acid expired, so that the normal amount of heat may still be generated,—yet there are clear indications that, when thus present in the blood, with other materials which ought to

* Thus it is well-known that the West Indian negroes, who drink a great deal of cane-juice during crop time, become fat upon it.

be excreted, Alcohol exerts an injurious influence, by retarding *their* combustion. Hence we may conclude, that Alcohol is really *less* fit to act as a heat-producing material, than the other substances which are naturally provided for the purpose; and that the temporary warming effects which are experienced from it, are due, in the first place, to the rapidity with which it is absorbed into the circulating current, no previous process of digestion being required; and, in the second, to the quickened action of the heart and more rapid movement of the blood, which are maintained *for a time* by its stimulating action.

160. That it does possess such a temporary power, especially when, from a long previous fast, there is a lack of other heat-producing material in the blood, and when the severity of the cold tends to produce a stagnation of the circulation, is a fact that cannot be disputed. But there is ample evidence that the same power is afforded, at least as effectually, by other substances, which have not the disadvantage of occasioning subsequent depression; and in particular by easily-digested solid food, especially such as includes oleaginous matter, taken in conjunction with hot liquids, especially Coffee or Cocoa.—In proof of this assertion, we shall now cite a series of facts, which are, we conceive, quite adequate to demonstrate it.

In the first place, the Author may relate his own experience of a journey performed on the outside of a stage-coach from Exeter to Bristol, on the 20th of January, 1838, a day memorable for the severity of its temperature, and for that remarkable prediction of the occurrence, which gave a temporary celebrity to "Murphy's Almanack," the thermometer standing at 8°, or twenty-four degrees below freezing-point. Having fortified himself with a hearty breakfast, and having been in some measure previously inured to the cold by a severe frost of a fortnight's duration, he did not suffer from it to any extraordinary degree; and with the aid of a fresh supply of food at dinner, he arrived at his journey's end without any greater degree of numbness of the extremities, than a short exposure to the genial warmth of a good fire sufficed to remove. No fermented liquor was taken by the writer on this journey, which occupied about nine hours; and he cannot think that he could have derived any other benefit from it, than that, by accelerating the general circulation for a time, it might have possibly kept up a more rapid flow of blood through the surface and extremities. But this would have been a doubtful benefit, if at the same time the combustion of the materials supplied by the food had been retarded by the presence of alcohol in the blood.

The Author has heard many of the now almost extinct race of stage-coachmen,—who had been induced to give up their former habit of imbibing a glass of ale or brandy-and-water at every stage, and to substitute an occasional cup of hot coffee and a rasher of toasted bacon, —speak so decidedly in favour of the superior efficacy of the latter system, that he doubts if any man who had the resolution to adopt it, ever returned to his old habits, except from the love of liquor.

161. Experience, on a much larger scale, and under a greater severity and longer continuance of cold, most fully confirms these conclusions. The Esquimaux, Greenlander, or Canadian, relies upon his solid aliment, which contains a considerable amount of oleaginous matter, for his power of resisting cold; and when amply supplied with food, is comparatively indifferent to clothing.

Thus Captain Parry mentions with surprise, that he saw an Esquimaux female uncover her bosom, and give her child suck, in the open air, when its temperature was *forty degrees below zero*. And Sir J. Richardson, in a letter to the writer, states that "plenty of food and sound digestion are the best sources of heat," and that "a Canadian with seven or eight pounds of good beef or venison in his stomach, will resist the greatest degree of natural cold, in the open air, and thinly clad, if there be not a strong wind."

The inhabitants of Arctic regions appear to have a natural relish for the very oleaginous food which Nature has provided for them, in the whales, seals, bears, and other animals upon which they chiefly subsist; and this taste is acquired by Europeans when exposed to the same conditions. Thus Dr. King, who accompanied Sir George Back in his overland expedition in search of Sir John Ross, informed the Author that whereas he had been previously accustomed to reject every particle of fat, owing to the dislike he felt for it, he found himself able, during his Arctic journey, to eat any amount of it with relish, and even experienced a positive craving for it; and his experience led him to consider himself as far better fortified against the cold by the use of an oleaginous diet, than by that of fermented liquors.

Testimony to the same effect is given by Dr. J. D. Hooker, who was one of the medical officers in the Antarctic expedition under the command of Sir James Ross. He says, in a letter to the Author,—"Several of the men on board our ship, and amongst them some of the best, never touched grog during one or more of the Antarctic cruises. They were not one whit the worse for their abstinence, but enjoyed the same perfect health that all the crew did throughout the four years' voyage. Many of our men laid in large stocks of coffee; and when practicable, had it made for them after the watch on deck. These men, I believe, would willingly have given up their spirits in exchange for coffee; but we could not ensure them the latter on the requisite occasions."

162. The foregoing statements appear sufficient to prove,

that a sufficient supply of Heat-producing food effects all that can be attributed to Alcoholic liquors in sustaining the heat of the body; but we shall now go further, and endeavour to establish the position, that the use of Alcoholic liquors is *positively injurious*, when the exposure to cold is prolonged, and especially when muscular exertion is required.

Thus Dr. Hooker says, in the communication just cited:—"I do think that the use of spirits in cold weather is generally prejudicial. I speak from my own experience. It is very pleasant. The glass of grog warms the mouth, the throat, and the abdomen; and this, when one is wet and cold, with no fire, and just before turning into damp blankets, is very enticing. But it never did me one atom of good; the extremities are not warmed by it; and when a continuance of exertion or endurance is called for, the spirit does harm, *for then you are colder or more fatigued a quarter or half an hour after it, than you would have been without it.*"

The testimony of others who have been subjected to still more trying exposure, is to the same effect. Thus Sir J. Richardson states, as the result of his most severe experience,—"I am quite satisfied that spirituous liquors, though they give a temporary stimulus, diminish the power of resisting cold. We found, on our Northern journey, that tea was much more refreshing than wine or spirits, which we soon ceased to care for, while the craving for the tea increased."—Dr. King's testimony was precisely to the same effect.—And Mr. R. A. Goodsir, in his "Narrative of an Arctic Voyage to Baffin's Bay and Lancaster Sound, in search of Friends with Sir John Franklin," after speaking of tea and coffee as "the whaling sailor's greatest luxury and comfort," continues, "he has no objection to his grog; but I think he has, long ere this, found out that *strong hot tea or coffee, particularly the former, is by far the best beverage he can take in these climates.*"

Again, the Hudson's Bay Company have for many years entirely excluded spirits from the fur-countries to the north, over which they have exclusive control; "to the great improvement," as Sir J. Richardson states, "of the health and morals of their Canadian servants and of the Indian tribes.

The Rev. Richard Knill, for many years a Missionary at St. Petersburg, stated in a Public Meeting, in regard to the delusion which prompted people to use ardent spirits "to keep out the cold," that the Russians had long since found out the injurious effects of taking them in very cold weather. When a regiment was about to march, orders were issued over-night that no spirits were to be taken on the following morning; and to ascertain as far as possible that the order had been complied with, it was the practice of their officials answering to our corporals, carefully to smell the breath of every man when assembled in the morning before marching, and those who were found to have taken spirits were forthwith ordered out of the ranks, and prevented from

marching on that day; it having been found that such men were peculiarly subject to be frost-bitten and otherwise injured.—Every soldier in the Russian service, it may be remarked, has an allowance of *oil* as part of his regular rations; experience having shown its value as a constant supporter of heat.

163. Such, in fact, is the overwhelming weight of evidence on this point, that in all the Arctic expeditions which have been sent out by the British Government during the last few years, the Total Abstinence system has been adopted; and with the best effects, as will appear from the following testimonies, among others that might be cited.

The Author has been assured by Sir John Richardson, that the experience of his last expedition (undertaken in search of Sir John Franklin) fully bore out the statements which he had made before proceeding on it; the whole party having sustained the full severity of an Arctic winter, in a manner in which he was confident (from his former experience) they could not have done, if even a moderate allowance of spirits had been employed. He mentioned, as a proof of his own power of resisting cold on the Total Abstinence system, notwithstanding his advanced years, that he was accustomed every evening during the residence of the party at winter-quarters, to cross from the dwelling-house to the Observatory at a short distance,—going out from a room of the temperature of 50°, into an atmosphere of 50° below zero (that is, enduring a change of *a hundred degrees*), without even putting on his great-coat.

The Author has also been assured by Surgeon Donnet (whose evidence before the Admiralty Committee will be cited hereafter, § 183), that his experience of the Total Abstinence system in Captain Austen's expedition was equally satisfactory.

Captain Kennedy, who commanded the expedition sent out by Lady Franklin in search for her husband, says, in closing the narrative of his labours:—"I have the satisfaction to remark that, although our crew suffered somewhat from scurvy, they have all returned, to a man, in comparative health; which I attribute in a great measure to the strictly teetotal principles on which the expedition was carried out, and the consequent harmony and good conduct of the men throughout.

It is worthy of remark, that no difficulty has been experienced in obtaining able seamen for these expeditions, notwithstanding that they well knew that they would be deprived of their customary allowance of spirits. This shows that the men themselves are well aware of their inutility under such circumstances.

164. That such are the teachings of sufficiently prolonged experience, not merely in the frigid zone, but wherever the

same conditions present themselves, will appear from the two following statements:

It is mentioned by Dr. Forbes,* as the result of his personal inquiries from the guides at Chamouni, that when they are out upon their winter expeditions among the Alpine snows, they never find it advantageous to take anything stronger than the weak wines of the country; considering the use of spirits to be decidedly inimical to their power of sustaining exertion in an atmosphere of very low temperature.

The Author had the opportunity, a few years since, of conversing with a very intelligent man of above seventy years of age, residing at Wareham, in Dorsetshire, who had spent more than fifty winters as a fowler; in which vocation he had been exposed to the utmost severity of the winter's cold; since it can of course be most profitably pursued, when the largest number of birds are driven southwards by the intensity of the frost in their northern residence. He stated that he had frequently been out for a fortnight at a time, without lying down save in his little boat, and scarcely ever obtaining warmth from a fire during that period; and notwithstanding such severe trials, he was a remarkably hale and vigorous man for his years. Being himself the proprietor of a small public-house, he could not be supposed to have any prejudice against the use of fermented liquors, in which he indulged in moderation; but his testimony was most explicit to the following effect:—that although the use of ale or brandy might seem beneficial in causing the cold to be less felt at first (so that when out for no more than a day or two, he did not think it necessary to abstain from it), the case was quite reversed when the duration of the exposure was prolonged; the cold being then more severely felt, the larger the proportion of fermented liquors taken. And he further stated, that all the fowlers of his acquaintance, who had been accustomed to employ brandy with any freedom, whilst out on prolonged expeditions, had died early; he and his brother (who had practised the same abstinence as himself) having outlived nearly all their contemporaries.

165. To conclude, it has been shown to be Physiologically probable, that whilst the use of Alcoholic liquors may for a time afford assistance in maintaining the heat of the body, so as the better to enable it to resist the influence of severe cold, they have no such advantage over Oleaginous matter, in affording a *pabulum* for the respiratory process, as sufficiently compensates for their injurious effect in producing a stimulation which must be succeeded by a subsequent depression, and in preventing or retarding the oxygenation of those ingredients of venous blood, which ought to be continually eliminated by the respiratory process.

* "Physician's Holiday," p. 26, *note*.

166. The predictions thus based on Scientific principles, are found, as we have seen, to be in most perfect harmony with Experience. For this teaches, in the first place, that although Alcoholic liquors may afford advantages equal, or in some respects, superior, regarded simply as materials for the combustive process, to those derivable from solid food, those advantages are not of long duration; so that, *for enabling the body to resist the continued influence of severe cold, Alcoholic liquors are far inferior in potency to solid food, especially of the Oleaginous kind.* And, secondly, that although the increase in the energy of the circulation, resulting from the stimulating effect of Alcoholic liquors, may prevent the depressing influence of the cold from having its ordinary action upon the system, provided that it be exerted only whilst that effect lasts; yet that, *after it has subsided, the cold is felt with augmented severity, and its action upon the system is proportionately injurious.*

4. Endurance of Extreme and Continued Heat.

167. We have next to consider the reputed efficacy of Alcoholic liquors in supporting the system under the enervating influence of extreme Heat. The belief in the existence of such an agency is scarcely less strongly or generally entertained, than that of their protective power against cold; but it must be manifestly due, if it exist, to some *modus operandi* different from that which renders them serviceable in the opposite condition. For it cannot be imagined that they can be of any service by affording pabulum for the *combustive* process, when that process is already generating more heat than the body, exposed to a high external temperature, can possibly need. Nor can it be fairly supposed that the loss of the *watery* portion of the blood, by the perspiratory process, can be in any degree repaired by the ingestion of *alcoholic* liquids. It might be presumed, then, that whatever energy their use may communicate to the body, must be derived from their *stimulating* properties; and must be subject to those disadvantages, which are inseparable from the habitual employment of stimulants.

168. That the use of Alcohol is especially necessary to support the system under its excessive loss by perspiration

at high temperatures, is, however, an idea so commonly held, that it demands a serious refutation; although the fallacy of the notion, that because *water* is drawn off from the blood through the pores of the skin, *Alcohol* must be taken into the stomach to replace it, would appear self-evident. The fundamental error seems to lie in the notion, that copious perspiration in itself really weakens the system; whilst it is, in fact, nothing else than the means by which the external warmth is prevented from raising the heat of the body above its normal standard, by the evaporation of the *watery* portion of the blood, which is readily supplied by the introduction of water into the stomach.

169. That Perspiration, however abundant, has in itself no weakening effect, appears from the fact, that when persons exposed to a very high temperature make no bodily exertion, they do not experience any loss of vigour, if copiously supplied with cold water. In fact, such exposure may be made to conduce very decidedly to the invigoration of the system. All travellers who have tried the Russian baths, speak of the feelings of renovation which the copious perspiration, and the subsequent plunge into cold water, produce in the wearied frame. And those who have given a fair trial to the Hydropathic treatment, in *appropriate cases*, are unanimous in the same testimony.

170. The peculiar fatigue which results from muscular exertion at a high temperature, is rather to be attributed to the unfavourable nature of the conditions under which the exertion is made.—One of these is the interference with the vaporous or "insensible" transpiration, which is produced by the accumulation of liquid or "sensible" perspiration on the surface of the skin, and by the saturation of the garments in contact with it. For the same fatigue is experienced when the atmosphere is loaded with dampness, even at a low temperature; and it has been the uniform result of the attempt to use any muscular effort, when the body has been clothed in waterproof garments made after the fashion of ordinary clothes, so as not only to keep out the rain, but to keep in the insensible perspiration. In either case, the effect is the same; the due vaporization of fluid at the surface of the skin is checked; the cooling influence of the perspiration is not exerted; and the heat of the body itself

is injuriously augmented. On the other hand, such exertion can be performed with much less feeling of exhaustion in an atmosphere of *dry* air, though of very high temperature, —such as that of glass-houses, gas-works, or foundries,— provided that water is freely supplied as drink; and as a far larger amount of liquid will then be carried off by insensible transpiration, it is obvious that the loss of liquid from the skin is *not* the cause of the peculiar exhaustion that results from muscular exertion in a heated atmosphere; and that we are partly to look for the source of that exhaustion in the elevation of the temperature of the body itself, which will be produced with peculiar facility in a damp and heated atmosphere.

171. But again, when Nervo-Muscular exertion is being put forth in a heated atmosphere, a greatly-increased amount of refuse matter is imparted to the blood by the decomposition of the nervous and muscular tissues, at the very same time that the diminished activity of the respiratory function (§ 109) tends to retard the combustive process. There will, consequently, be an accumulation of this effete matter in the blood; and strong reason is afforded by our knowledge of its injurious character, and by the renovating effects which follow its removal and the restoration of the purity of the blood, to regard this accumulation as the chief source of the peculiar feeling of fatigue which is consequent upon exertion made in a high external temperature.

172. If, then, our fundamental positions have been just, and our argument correct, we should infer that, putting aside their peculiar influence upon the nervous system, the use of Alcoholic liquors during muscular exertion in a heated atmosphere, can be nothing else than injurious; as tending to interfere still more with that elimination of excrementitious matters from the blood, which is peculiarly required when an increased production of such matters is taking place, and which is already retarded by the diminution in the activity of respiration.—We shall presently find that experience is here also in accordance with theory; the result of many trials having shown, that severe and long-continued exertion in tropical climates can be better maintained *without* Alcoholic liquors, than *with* their habitual use.

173. The stimulative effects, from which Alcoholic liquors derive their reputation as supporters of bodily vigour, during habitual exposure to a heated atmosphere, are exerted in two ways; in the first place, by giving temporary assistance to the digestive process; and secondly, by increasing, for a time, the nervous and muscular power. It is commonly supposed that the diminution of appetite, which is experienced by most persons who change their residence from a temperate country to a hot one, is the result of the enervating influence of the climate; whereas the fact is evident to those who take into account the proportionally smaller amount of carbonic acid exhaled as the external temperature rises (§ 109), that the diminished appetite chiefly results from diminution in the demand for combustive material; and that it ought, therefore, to be taken as an indication of the propriety of lessening the amount of food ingested, rather than of forcing the stomach to augmented activity for the purpose of disposing of the superfluity which it has taken in.

174. Now all Medical authorities on the Diseases of Tropical climates, are in accord upon this point,—that, next to the injury derived from the abuse of fermented liquors, excess in diet is one of the most fertile of those sources of disease which arise out of the personal habits of the individual; and such excess is in great degree due to the use of alcoholic stimulants as an artificial provocative to the appetite, whereby the blood becomes charged with more alimentary material than it can rightly dispose of (§§ 60—62).

175. There is no reason whatever to believe, that (except as regards the greater rapidity of their action, § 108) the stimulating influence of Alcoholic liquors upon the nervous system is exerted in any other mode, when the body is habitually exposed to a high temperature, than that in which it operates under ordinary circumstances. That the excitement must be followed by subsequent depression, is as true in India as in England; and that this excitement, if habitually had recourse to, will be followed in hot climates by consequences even more injurious than in cold or temperate regions, might be inferred from all that has been already stated, in regard to its peculiar unsuitableness when the activity of the respiratory process is diminished.

176. We shall now proceed to inquire, therefore, how far the experience, both of individuals and of large bodies of men, supports the idea, that Abstinence from alcoholic stimulants, or at most the very sparing use of them, is favourable to the endurance of extreme Heat, especially when great bodily exertion is required.

We shall first cite the evidence of the late Mr. Gardner, a well-educated surgeon, who spent several years of most active exertion in the exploration of the botany of Brazil, into which country he penetrated further than any scientific European had previously done. During three years' travelling in that climate, he tells us,* under constant fatigue and exposure to vicissitudes of weather and irregularity of living, his only beverage, besides water, was tea, of which he had laid in a large stock previously to his departure from Pernambuco. He was told, when he arrived at Brazil, that he would find it necessary to mix either wine or brandy with the water which he drank; but a very short experience convinced him, not only that they are unnecessary, but that they are decidedly hurtful to those whose occupations lead them much into the sun. "Whoever drinks stimulating liquors," he says, "and travels day after day in the sun, will certainly suffer from headache; and in countries where miasmata prevail, he will be far more likely to be attacked by the diseases which are there endemic."

Equally explicit testimony is borne by Sir James Brooke, the enterprising colonizer of Borneo; who speaks in his "Journal" of habitual abstinence from alcoholic liquors as decidedly conducive to the maintenance of health, and of the power of sustained exertion, in the equatorial regions in which he has established himself.

So again, Mr. Waterton, the well-known traveller, speaks of himself as confident that the preservation of his vigour during many years of toil and exposure in tropical climates, has been mainly due to his total abstinence from fermented liquors.

The writer has been assured by Dr. Daniell, who has been for a long time stationed as medical officer in the equatorial portions of Western Africa, that he has found the use of the ordinary alcoholic liquors decidedly inimical to the power of exertion; the strongest beverage which could be habitually made use of without injury, being the palm-wine of those countries, which is very little, if at all, more alcoholic than our ginger-beer.

The Rev. C. Rattray, a zealous and well-known missionary in Demerara, thus writes (Dec. 9, 1852):—"When I arrived in this colony, I was led to suppose that it was absolutely necessary for Europeans to use something stronger than water in this wasting climate. Indeed, I was fully assured, by all with whom I happened to become acquainted, that the daily use of some stimulant was required to keep up the strength and to sustain the system under the incessant drain of per-

* "Travels in Brazil," p. 402.

spiration to which it is subjected in a tropical climate. Then, in *this low, swampy land,* such stimulant was the more necessary. The universal practice was quite in keeping with that opinion: and without giving the matter much consideration, believing what everybody else seemed to believe, and doing as others did, I adopted the common notion, and followed the prevalent custom of the colony.—It is now about thirteen years since I adopted the total abstinence principle, and I am fully convinced that I have, during that period, enjoyed better health than I should have done if I had accustomed myself to the moderate use of any kind of strong drink. I have enjoyed almost uninterrupted health; and after more than eighteen years' residence as a missionary in this not very invigorating climate, I cannot say that I am, as yet, conscious of any feeling of abatment in my wonted strength. I am happy to say that all my missionary brethren are also teetotalers; and I am quite sure that their testimony will be in precise accordance with my own on this subject."

The following testimony, given by Dr. Mosely in his work on Tropical Diseases, may be added to the foregoing:—"I have ever found," he says, "from my own knowledge and custom, as well as from the custom and observation of others, that those who drink nothing but water, or make it their particular drink, are but little affected by the climate, and can undergo the greatest fatigue without inconvenience."

Mr. H. Marshall, Deputy-Inspector of Hospitals, gave the following evidence respecting his own experience and that of Dr. Robert Jackson, whose work on "The Formation and Discipline of Armies," is now regarded as the highest standard on the subject.—"The first error with respect to the uses of ardent spirits, which I mean to oppose, is, that they contribute to enable men to undergo fatigue. This is, I believe, a very common error. Spirits never add permanent strength to any person. In all climates, the temperate livers are the fittest to undergo fatigue. Dr. Jackson travelled 118 miles in Jamaica in four days, and carried baggage equal in weight to the common knapsack of a soldier. He says: 'In the journey which I have just now mentioned, I probably owe my escape from sickness, to temperance and spare diet. I breakfasted on tea about ten in the morning, and made a meal of bread and salad after I had taken up my lodging for the night. If I had occasion to drink through the day, water or lemonade was my beverage.' He concludes his observations by stating: 'I have introduced my own experience on the present occasion, because it enables me to speak from conviction, that an English soldier may be rendered capable of going through the severest military service in the West Indies, and that temperance will be one of the best means of enabling him to perform his duty with safety and effect.'—Personal experience has taught me, that the use of ardent spirits is not necessary to enable an European to undergo the fatigue of marching, in a climate whose mean temperature is between 73° and 80°, as I have often marched on foot, and been employed in the operations of the field with troops in such a climate, without any other beverage than water and coffee. So far

from their being calculated to assist the human body in enduring fatigue. I have always found that the strongest liquors were the most enervating; and this in whatever quantity they were consumed."

The Author was assured, about two years ago, by Mr. Robert Smith, a resident in Jamaica, who had been engaged in superintending railway works in that island, that in order to prevent the English labourers, who had been brought over for that purpose, from killing themselves with new rum, he had persuaded many of them to take the Total Abstinence pledge; and that the men who had done so, were far better able to perform their labour, than were those who drank even moderately of spirits. He had himself been induced to take the Total Abstinence pledge, as a means of inducing the men to do so; and anticipated nothing but discomfort from the relinquishment of the very moderate allowance (two glasses of wine daily) to which he had been accustomed. But he found himself so much better able to sustain the fatigues of a very active life, on the Total Abstinence system, that he was fully resolved to continue it.

177. Many other individual testimonies might be cited to the same effect; but as these are open to the objection of being influenced by peculiarities of individual constitution, it will be preferable to have recourse to cases in which *large bodies of men* are included.—The following statement, which the writer has received from an officer in the regiment to which it refers, proves that our English soldiers in India not only do not suffer from, but are absolutely benefited by abstinence from Alcoholic liquors, during a continuance of unusually severe exertion.

"In the early part of the year 1847, the 84th regiment marched by wings from Madras to Secunderabad, a distance of between four and five hundred miles. They were forty-seven days on the road, and during this period the men were, practically speaking, teetotalers. Previously to leaving Madras, subscriptions were made among the men, and a coffee establishment was organized. Every morning, when the tents were struck, a pint of hot coffee and a biscuit were ready for each man, instead of the daily morning dram which soldiers on the march in India almost invariably take. Half-way on the day's march, the regiment halted, and another pint of coffee was ready for any man who wished it. The regimental canteen was opened only at ten and twelve o'clock for a short time, but the men did not frequent it; and the daily consumption of arrack for our wing was only two gallons and a few drams per diem, instead of twenty-seven gallons which was the daily Government allowance. The commanding officer employed the most judicious precautions to prevent the men from obtaining arrack in the villages on the route; and his exertions were effectively seconded by the zealous co-operation of the other officers, and by the admirable conduct of the majority of the men, who were fully persuaded of the

noxious influence of ardent spirits during exercise in the sun. The results of this water-system were shortly these:—Although the road is proverbial for cholera and dysentery, and passes through several unhealthy and marshy districts, the men were free from sickness to an extent absolutely unprecedented in our marches in India: they had no cholera and no fever; and only two men were lost by dysentery, both of whom were old chronic cases taken out of hospital at Madras. With these exceptions, there was scarcely a serious case of sickness during the whole march. The officers were surprised that the men marched infinitely better, with less fatigue, and with fewer stragglers, than they had ever before known; and it was noticed by every one, that the men were unusually cheerful and contented. During the whole march, the regiment had not a single prisoner for drunkenness."—A considerable proportion of the men (the writer has learned from his informant) abstained entirely from arrack: and the consumption of those who occasionally took it, was far below their usual allowance. Those who *entirely* abstained were certainly in no respect inferior, either in power of sustaining exertion, or in freedom from sickness, to those who occasionally took small quantities of spirits; on the contrary, they rather seemed to have the advantage. That this remarkable result was not due to any peculiar healthfulness of the season, or other modifying circumstance, is shown by the fact that the wing of the 63rd regiment, which performed *the same march, at the very same time*, though in the opposite direction, lost several men out of a strength of 400; and that it had so many sick, that, when it met the 84th on its march, it was obliged to borrow the spare "dhoolies" (or palanquins for the sick) belonging to the latter.

The foregoing account fully accords with that given by Sir James (then Mr.) McGrigor, of the march in Egypt of a division of the British army, sent from Hindustan to aid the main army in opposing the French under Bonaparte. After the Great Desert had been crossed, in July, 1801, no spirits were issued to the troops in Upper Egypt, owing to a difficulty in procuring carriage for them. At this time there was much fatigue-duty to be performed, which, for want of followers, was done by the soldiers themselves; the other duties were severe upon them; they were frequently exercised, and were much in the sun; the heat was excessive, the thermometer standing at 113° or 114° Fahr. in the soldiers' tents in the middle of the day; *but at no time was the Indian army more healthy.**

178. Whatever temporary advantage, then, is derived or supposed to be derived, from the stimulating powers of Alcoholic liquors, when they are used with a view of sustaining the power of exertion in tropical climates, is dearly purchased by the increased liability to disease, which not only *theoretically*, but according to all competent evidence,

* "Medical Sketches of the Expedition from India to Egypt," p. 86.

actually results from their habitual use. And thus Theory and Practice are again completely agreed, in affording a decisive contradiction to the usually received idea, that Alcoholic liquors assist the body in the endurance of Heat.

5. Endurance of Extreme Vicissitudes of Temperature.

179. Although it might be not unfairly considered that the proof which has been given, not merely of the *inutility*, but of the *positively injurious effects* of the employment of Alcoholic liquors, for the purpose of sustaining the powers of the system under exposure to severe and continued Heat or Cold, might supersede the necessity of any further discussion under this head,—yet as it might be argued that *vissicitudes* of Temperature are more trying to the constitution, than the lengthened continuance either of heat or cold, and that they exert an influence of a different kind upon it, the subject appears worthy of special consideration.

180. It will be generally conceded, that there is no kind of life, which subjects the individual who follows it to so many vicissitudes, as that of the Seaman. His duties carry him into every variety of climate, from the scorching heats of the Equatorial sun, to the intensest cold of the dark and dreary Arctic winter; and in the course of a single voyage, he will be frequently subjected to the most trying and extreme alternations within a very limited period. When it is considered, in addition, that he has no kind of protection from these, but that his duties involve the fullest exposure to them, and the most severe exertion under the most trying circumstances, it seems impossible to resist the conclusion, that what is good for the seaman, must be good for every one else under circumstances in any degree resembling his.

181. Now the experience of the last twenty-five years may be considered to have settled this question most conclusively; for the *Temperance* principle (which in the Sailor's case is *Total Abstinence*—no other Alcoholic liquor being substituted for the spirit-ration when this is discontinued) has now extended from the few ships into which it was at first introduced, into a large part of the Mercantile Marine

of this country, and into nearly the whole of that of the United States, including several hundred whale-ships; and many naval officers, of large experience, advocate its introduction into the British Navy, in which it has been already partially acted-on, the allowance of spirits having been recently reduced one-half, in conformity with the recommendation of the Admiralty Committee, whose Report will be presently adverted-to. Now this alteration could not have been effected, unless sailors, as a body, had become aware that they are really better without the spirit-allowance, than with it. When the plan was first introduced, there was a difficulty in obtaining good crews for "Temperance Ships," which were decidedly unpopular among seamen; and some large shipowners, who much desired to adopt the system, and persevered for some time in the attempt to do so, found themselves unable to carry it out. But the change of opinion on this subject among seamen has been so great, that there is no longer the least difficulty in getting excellent crews for "Temperance" ships, when the employ is considered good in other respects, and a fair compensation is made, either in increase of wages, or in the superior quality of the provisions and allowances, for the "stopping of the grog." In fact, such ships are in positive request among seamen of the best character; proving that, in spite of the well-known attachment of their class to spirituous liquors, they are sensible of the advantages of habitual abstinence from them.

182. The Admiralty Committee, to which allusion has just been made, had for its special object to inquire how far the *Discipline* of the Navy might be improved by the reduction or withdrawal of the spirit-allowance; and a large part of the evidence taken by it, had reference to this point, which has been already adverted to (§ 51). The witnesses examined were fifty in number; forty-five of whom held various ranks in the Government service, from that of Commander to that of ordinary seaman, whilst four held appointments in the Merchant service,—the Author being the only witness examined, who was unconnected with either. The evidence, therefore, may be regarded as that of a body of *practical* men, having no theory or system to support,—all their class-associations, as well as their individual predilec-

tions, (so far as appears from their statements), being in favour of the spirit-ration, and nothing, save experience of its results, leading them to a different conclusion. The following are some of the most important facts, bearing upon our present subject, which came out in the evidence given on this occasion.

183. It was the concurrent opinion of the witnesses examined, that the disadvantages of the spirit-ration in regard to discipline, are not counterbalanced by any benefit as regards the maintenance of the health of the men, or to their power of sustaining heat, cold, or labour. The constant employment of this large quantity of stimulus, also tends to diminish the benefit which may be obtained from an extra-allowance under particular circumstances; and, what is perhaps worse than all, it is the most potent means of keeping alive that love of drink, which has been the great bane of the sailor's life, and which (as appears from the evidence of various individuals well acquainted with the habits of the class) has been undergoing a spontaneous abatement during the last ten or twelve years, to an extent which is far from being generally known.

The following are among the statements as to the working of the Total Abstinence principle on board ship, given to the committee by Captain Chadwick, of the American liner 'Sir Robert Peel.'—"For the last twelve years I have sailed on the strict principle of temperance, and have found it work well, and no complaint among the men; they were always ready to do their duty, and do it cheerfully, which I did not always find to be the case when spirits were allowed them. The American merchant-ships nearly all sail upon the temperance principle. Even in our whaling-ships, of which there are nearly 700 vessels, there is not one in twenty in which spirits are allowed; and thus far, they have been very fortunate in their voyages, which are from two to four years, generally cruising in all climates where their voyages can best be accomplished." In bad weather, Captain Chadwick allows coffee; and he is by no means the only witness who gives the opinion that, when extra exertion is cal ed for, warm tea or coffee is preferable to "splicing the main-brace;" some of the men having given this as their own experience, although they admit that the grog would be generally preferred.

Dr. J. Robertson, who had been in the service twenty-two years, and was surgeon to the 'Enterprise,' one of the ships in Sir James Ross's Antarctic Expedition, gave it as his opinion, derived from his personal observation, that the more the spirit-ration is reduced, the better it will be for the health, strength, and general welfare of the men, if it

cannot be done away with altogether; and he considers that his statements apply equally well to tropical and to arctic voyages. With reference to the latter, he particularly states, that although he considers some "indulgences" necessary, when the men are suffering from cold, wet, or fatigue, yet he would prefer the employment of warm tea or coffee, where they can be had, to that of spirits. He says, too, that the whalers have no regular allowances of spirits—only having an issue occasionally when there is heavy work; and he speaks of it as the regular practice among the hunters of the North-West Company, and also among those of Australia, to take tea instead of spirits on their journeys, from the experience of the more sustaining qualities of the former.

Surgeon James Donnet, who had been ten years in the service, bore testimony to the frequently injurious influence of the spirit-ration in tropical climates. Several of the men on board the 'Calypso,' who were subject to derangement of the digestive organs, caused by a long sojourn beneath a tropical sun, would drink their allowance, under an impression that it would strengthen them, and render them fitter for their work. Whilst the excitement lasted, this proved true; but as soon as past, it was invariably followed by lassitude. Two of such cases terminated in liver-complaint. He is very confident that warm tea is preferable to spirits, in case of severe labour in cold and wet; and states the following remarkable example of the preference shown in its favour, under circumstances of a peculiarly trying nature:—"I have heard an officer, who was in the 'Quail' cutter when wrecked in the Bay of Biscay in 1836, say, that for ten days, (during which the weather was so bad that the man at the helm was obliged to be lashed, the sea at times making a clean breach over her), although grog was offered to the men on deck every hour, they refused it, preferring warm tea; not that they disliked grog, but that tea proved in their case the most invigorating beverage." This gentleman has since acted as surgeon in one of the recent Arctic expeditions (§ 163).

Dr. Patrick Martyn, who had been twenty-three years in the service, states it as his opinion, that after great fatigue and exposure to cold and wet, hot tea, coffee, or cocoa, are preferable to grog; and mentions that in North America, having more than once pilots on board in snowstorms, who remained at the bowsprit-end during twelve hours at night, they refused grog though he recommended it to them, and took coffee in preference, as that which best enabled them to sustain this severe exposure. The only case in which he thinks it likely that the allowance of spirits is positively beneficial, is that of men exposed in boats to the malaria of swampy districts, as on the coast of Africa; and even then he thinks that hot coffee, could it be procured, would be just as efficacious.

The following extract from a private letter from a Captain in the merchant-service, contained in the "Adviser" for October, 1849, gives a valuable testimony in favour of the same conclusion:—"I harboured in Newfoundland on the 23rd of December last, the coldest day that had been registered there for the last six years, the thermometer on shore

indicating twenty degrees below zero. I can honestly say, it was the most severe frost I ever was in on the water, during the twenty-nine years that I have been employed in the Newfoundland trade. I remained on shore from the time mentioned above, until the 2nd of March, and then embarked for Brazil, where, in April, we had the thermometer ranging from 80° to 87°, and remained in that climate till the middle of July. All that time, the whole of my crew, with two exceptions, were strictly teetotal, and all able to eat their allowance, and do their share of hard work, in the sun and out of it, taking in and out cargo. The two exceptions did, in one solitary instance, infringe the law; and they paid the penalty in severe headache and debility for some days."

"Those ships' crews," says Drs. Mussey and Lindsly, "who now visit hot and sickly climates without spirits, have an average of sickness and mortality strikingly less than those who continue the use of it as formerly. The brig 'Globe' has lately returned from a voyage to the Pacific Ocean; she had on board a crew of ten persons, and was absent nearly eighteen months. Though during the voyage she was in nearly all the climates in the world, she had not one person sick on board; and brought all the crew back, orderly and obedient. All these advantages Captain Moore attributes, in great measure, to the absence of spirituous liquors. There was not one drop used in all that time; indeed, there was none on board the vessel."

184. Surely no comment is needed on the foregoing statement. As there are no vicissitudes and exposures more trying than those which fall to the lot of the Seaman, the recorded experience of the thousands and tens of thousands who have tried the experiment, must be admitted as incontestible evidence, not merely of the *safety*, but of the *positive advantage* of the Abstinence system under all such circumstances.

6. Power of Resisting Morbific Agencies.

185. Of the diseases to which the Human body is liable, a large class arises from direct violations, on the part of the individual, of the rules of health; in regard to quantity or quality of food or drink, imperfect respiration, insufficient or excessive exertion, or the like. But there is another large class, in which the essential cause of the disease must be considered to lie in some *external* agency, which, although it cannot be rendered obvious to the senses, is fully cognizable by its effects upon the system,—producing in it, like poisons which can be seen and touched, a very definite

series of changes, frequently of the most severe and rapidly fatal character. The types of this class of agents are those "zymotic" poisons, which are the causes of *epidemic* diseases generally, as well of a large number of *endemic* diseases;* the nature of their action on the blood (it is now generally admitted) being akin to that of yeast or some other "ferment" upon a fermentable fluid. Of this group, the most important are fevers of all kinds, (intermittent, remittent, and continued), cholera, epidemic dysentery, and diarrhœa; some of which are distinctly traceable to poisonous *malaria* from marshes, swamps, bogs, &c., whilst others appear to originate rather in the *miasmatic* emanations from decomposing animal matter; and in some instances, both kinds of poison would seem to be in operation at once.—It is a common idea, and one apparently supported by adequate evidence, that such a use of fermented liquors as aids in keeping the body in "high condition," renders it less susceptible of the influence of pestilential miasmata, of cold and damp, or of other morbific agencies; and this belief is entertained by many, who deprecate the habitual use of fermented liquors under other circumstances. It will be desirable, therefore, that we should carefully inquire what science and an *extended* experience have to say on this subject.

186. Now in the first place, all experience tends to prove that no condition is so *favourable* to the invasion of zymotic disease,—if, indeed, it be not absolutely *essential* to it,—as the presence of decomposing organic matter in the blood, whether this has been introduced into it from without (as in food or drink), or has been generated in excessive amount within the body itself, or, having been produced in no more than the ordinary quantity, has been retained, in consequence of some incompleteness in the operations by which it is

* The term *epidemic* is applied to diseases which affect large numbers of people at once, and which are dependent, either upon contagion, or upon some atmospheric condition of a transient nature; by *endemic* diseases, on the other hand, are meant such as are habitually prevalent among a population, and which arise out of some peculiarity of soil, climate, or mode of life. The term *zymotic* is derived from the Greek term for fermentation.

usually got rid of.* Hence, as the channel by which matter of this kind is chiefly eliminated, is the respiratory process, it would follow that anything which interferes with that process, will most powerfully favour the action of zymotic poisons on the body; and if there be anything certain in medicine, it is the fact that deficient aëration of the blood, by whatever cause induced, does exert such an influence. Thus it is a remarkable fact, not generally known, that a considerable proportion of the survivors of that fearful night in the Black Hole of Calcutta, which was immediately fatal to 123 out of 146 persons, were soon afterwards cut off by putrid fever, obviously in consequence of the contamination of their blood from this cause. And ample proof is afforded by the history of the recent epidemics (especially that of Asiatic Cholera), that the same effect is produced by the same cause, in however slight a degree it may operate, *provided that its operation be protracted through a sufficiently lengthened period;* for the noxious matter accumulates within the body when its proper outlet is closed, until at last it makes its presence severely felt, by affording (so to speak) a fertile soil for the development of the seeds of the disease within the body, which would otherwise, by remaining dormant, have left it unharmed.

187. Further, we have seen it (§§ 6—8) to be one of the properties of Alcohol, that, when mingled with venous blood, it exerts *precisely the same effect as an insufficient supply of air*, in preventing its complete depuration in the lungs. Hence it may be stated with confidence, that the tendency of the habitual use of Alcoholic liquors is to induce a state of the blood exactly resembling (so far as this point is concerned) that which is brought about by imperfect ventilation, bad sewerage, noxious emanations, &c.;—namely, to contaminate it with the refuse generated in the body itself, whose due elimination is checked no less effectually by the presence of Alcohol in the circulating current, than it is by constantly shutting-up the doors and windows of our apartments, or by heaping together a mass of putrefying rubbish

* See an article by the Author, "On the Predisposing Causes of Epidemic Diseases," in the "British and Foreign Med.-Chir. Review," Jan., 1853.

in our cellars, or by damming-up our sewers and causing them to overflow into our kitchens, or by any other similarly approved means of causing the fever-germs to take root and flourish in our systems.

188. Now in cold and even in temperate climates, this tendency may never produce any serious results, if the quantity of Alcohol employed be no more than the respiratory process can get rid of, without leaving unconsumed some of the refuse products of the body itself. For there is a marvellous power of self-adjustment in the animal body, which regulates the rate of the combustive action, in accordance with the amount of heat which it may be necessary to generate, in order to keep up the temperature of the body to its proper standard (§ 109). The consequence of this will be, that if the same quantity of fuel be still thrown in, some of it *must* go off imperfectly consumed, or must be retained in the blood. Hence if our previous position be correct, it is the experience of *hot* climates which is the best fitted to bring to the test our doctrine respecting the direct influence exerted by the use of Alcoholic beverages, in favouring the invasion of zymotic diseases. For it is where the respiratory process is barely active enough to carry off the ordinary waste of the system, and where any extraordinary exertion, by producing increased waste which is not duly carried off, renders the system peculiarly liable to the attacks of zymotic disease, that we might anticipate the most serious results from the habitual introduction into the blood, of an agent whose presence tends still more to diminish the influence of the respiratory process upon the economy. And it is where the causes of zymotic disease exist in their greatest intensity, that we might expect to be able to determine what there is in the constitution or habits of certain individuals, which renders them peculiarly susceptible of their agency, whilst others, exposed to precisely the same influences, escape with entire impunity.

189. It is in India that we see, in all their dreadful malignity, the *constant* operation of causes of disease, which here make themselves apparent only when we are visited by some devastating epidemic. Hence, if the doctrine be correct, that the habitual moderate use of Alcoholic liquors tends to produce a state of blood resembling that which is produced

by insufficient respiration, it is in India that we ought to find the surest evidence, that entire *abstinence* from these beverages confers the greatest immunity from the attacks of zymotic disease, and, on the other hand, that even the moderate consumption of Alcoholic liquors will powerfully augment the potentiality of insufficient ventilation.

190. This evidence is furnished with a force and cogency which put it beyond dispute, by the statistics that have been already cited (Prop. IV.) in regard to the relative sickness and mortality of Europeans in India. And it will be here only requisite to put in a tabular form the comparative results of the Abstinent and Alcoholic systems, as presented in the experience of the 84th Regiment, compared with that of the general body of European troops in the Madras Presidency, and of the 63rd Regiment in particular (§§ 121—123, 177.)

	Deaths per 1000.
84th Regiment (abstinent or very temperate), Fort St. George	12·1
General average of the Presidency, excluding Secunderabad .	30·2
84th Regiment at Secunderabad (badly ventilated) . .	34·2
General average at Secunderabad	75·0
63rd Regiment at Secunderabad	78·8

Of the *excess* of average mortality (18·1 per 1000) among the troops quartered in the healthier stations, above that of the 84th whilst in Fort St. George, about 12 per 1000 may be fairly considered as representing the difference between a set of *total abstainers* and of *temperate* men, the average mortality of the latter having been already shown (§ 124) to be double that of the former; the remainder may be set down to the account of the *intemperate*, whom we have seen not to constitute any large proportion of the Madras army. Again, the excess of mortality of the 84th Regiment at Secunderabad, above Fort St. George (22·1 per 1000), is entirely attributable to the bad ventilation of the barracks. But while *temperance* alone kills its 12 per 1000, in addition to the 12 necessary deaths, and *bad ventilation* alone kills its 22·1 per 1000, *the use of alcoholic beverages and bad ventilation* combined, as shown in the *general* mortality at Secunderabad, raise up the annual average to 75, or even 78·8, per 1000.

191. If any confirmation of this result be required, it is

afforded not only by the personal experience of Mr. Gardner, Mr. Waterton, and Dr. Jackson, already cited (§ 176); but also by the extended observations of Dr. Jackson and Mr. Marshall, made upon large bodies of soldiers in different quarters of the globe; all of which go to prove that the more nearly entire Abstinence from fermented liquors is practised, the lower is the rate of mortality,—the difference being especially marked in tropical climates, where morbific agencies are most potent, and where, from the causes already adverted to, the greatest liability to them is apt to be engendered, by a neglect of any of the natural means of ensuring the purity of the blood.

192. It would not be fair, however, to cite only such results of experience as are favourable to the doctrine of Abstinence, and to pass by the statements of those who affirm that experience leads to a different conclusion. An impression prevails through a large proportion of the Medical profession, and has been supported by professed advocates of temperance, that, as regards the depressing influences of malaria at least, especially in cold and damp climates, the moderate habitual use of Alcoholic stimulants is desirable.—The two following cases are cited by Dr. Macnish, in proof of this doctrine:

"At Walcheren it was remarked that those officers and soldiers who took schnaps, *alias* brandy-drams, in the morning, and smoked, escaped the fever which was so destructive to the British troops; and the natives generally insisted upon doing so before going out in the morning."

Again, "A British regiment quartered on the Niagara frontier of Upper Canada, in the year 1813, was prevented by some accident from receiving the usual supply of spirits; and in a very short time, more than two-thirds of the men were on the sick-list from ague and dysentery; while the very next year, on the same ground, and in almost every respect under the same circumstances, except that the men had their usual allowance of spirits, the sickness was extremely trifling. Every person acquainted with the circumstances, believed that the diminution of the sick during the latter period, was attributable to the men having received the quantity of spirits to which they had been habituated."

193. Now it is obvious that neither of these facts proves that exposure to the morbific agencies in question renders an allowance of spirits necessary, or even beneficial, for

those who have *not* been accustomed to make use of it under ordinary circumstances. On the contrary, the second instance is a valuable testimony to the disadvantage of habitual dependence upon Alcoholic stimulants; inasmuch as it is evident that, when they were withheld from the troops, the constitution of the men was rendered peculiarly susceptible to the causes of disease indigenous to their locality. All that it proves is, that an unduly depressed state of the system is favourable to attacks of ague and dysentery (of which every medical practitioner is aware), and that in persons who have habituated themselves to the use of spirits, such depression is liable to supervene when the allowance is withheld, and may be for a time kept off by its restoration. And even the first example cannot be said to prove more than this; for it simply gives us the experience of individuals who took an early dose of spirits, as compared with that of the individuals who abstained from this habit; without telling us that the latter adopted any of those substitutes, which prudential experience would dictate. It is well-known that, in localities where zymotic poisons are rife, no condition of the healthy system is so obnoxious to their influence, as that which is natural to it on first rising in the morning, when the stomach is empty, the pulse comparative feeble, and the heat-producing power nearly at its minimum. The nutritive actions which have been taking place during repose, have prepared the nervous and muscular apparatus for renewed activity; but this has been accomplished at the expense of the blood, from which there has been a continual drain, both for the regeneration of the tissues, and for the maintenance of the animal heat. It is within the experience of most persons, that nervo-muscular exertion is less efficiently sustained,* and external cold less fully resisted, at this period, than at any other; and the recommendation of experience, to "take something to keep the cold out of the stomach," is here fully justified upon physiological principles. But it does

* The writer can speak feelingly on this subject; being himself unable to walk a couple of miles upon the empty stomach of early morning, without extreme languor almost amounting to faintness; although four or five times that amount would usually be performed by him after breakfast with scarcely an approach to fatigue.

not hence follow, that Alcoholic stimulants constitute the best means of protecting the system against the influence of morbific agencies; on the contrary, we shall find strong reason to believe that other means, properly employed, would be as efficacious at the time, and would have a more permanently beneficial effect.

194. A man in the enjoyment of vigorous general health, and not accustomed to depend upon Alcoholic stimulants, will derive all the protection he can require, from *taking his first meal* before he exposes himself to the cold, damp, or pestilential miasmata, whose influence is to be resisted; and the moderate use of hot tea, coffee, or cocoa, will help to diffuse a genial warmth through his body, which is more enduring than that which results from the ingestion of spirituous liquors. In this way the stomach will be healthfully employed, new material will be supplied to the blood, the circulation will be quickened without being excited, the firmness of the pulse will be increased, and the heat-producing power will be augmented; and all this, in a manner strictly accordant with the normal economy of the bodily system.—On the other hand, although the use of spirits, by producing a temporary excitement of the circulation, will probably render the system less susceptible to morbific agencies, than if it be exposed to them before its dormant energies have been in any way roused, yet we can scarcely anticipate that they can be as favourable to the *sustenance* of its energy (a previously healthy and vigorous condition being supposed), as persistence in the regular habits to which it has been accustomed. For it has been already shown, that the continued endurance of cold is not favoured by the use of Alcoholic liquors, but on the contrary is impaired by it; and where cold, therefore, acts concurrently with zymotic poisons, and favours their operation by the depression of the vital powers which it induces, we should confidently expect that those means would be most conducive to the resisting power of the system, which are most efficient in maintaining its standard warmth.

195. So far as we are acquainted with the bearings of Experience on this question, they are decidedly favourable to the view here advocated, namely,—that where a healthy state of the system has been previously maintained without

the assistance of Alcoholic liquors, the operation of morbific agents will be more efficiently warded-off by a continuance of the abstinent plan, than by recourse to stimulants; provided that the same precaution be exercised by the disciple of abstinence as by the spirit-drinker, in not exposing himself to the morning air, without some fortification of "the inner man." For we do not see that the circumstances of tropical, or those of cold or temperate climates, differ, as regards the susceptibility of the system to zymotic poisons, in any other particular than their temperature; but this will act in more than one way; for whilst on the one hand, the depressing influence of cold upon the body will tend to increase its susceptibility, the agency of heat, on the other, will augment the potency of the poison. The "pint of hot coffee and biscuit" taken by the soldiers of the 84th regiment (§ 177), must be admitted to have been far more efficacious than "the daily morning dram, which soldiers on the march in India almost invariably take;" and there is no adequate reason why such a meal should not have an equal value in colder countries, when employed with the larger allowance of heat-producing food which will be there required.—The Author's views on this point are fully confirmed by the following statements contained in the recently-published elaborate Treatise on the "Principal Diseases of the Interior Valley of North America," by Dr. Drake of Cincinnati; the fruit of *forty years'* careful and discriminating observation and inquiry, extending through a wide range of climates, and great diversities in habits of life.—When speaking of the employment of Alcoholic beverages among the population of the Valley, Dr. Drake remarks:

"From the first settlement of the Valley, until within fifteen or twenty years, morning bitters, or mint-juleps, were almost universal. They were generally composed of whiskey, and were very commonly drunk by all the members of the family, old and young, male and female. The custom, originating east of the mountains, and sustained by habit and the love of stimulation, was justified by its alleged advantages as a preventive of autumnal fever. Although not yet entirely broken up, it has been discontinued by a large majority of its advocates; and neither autumnal fever, nor any other disease, has increased in consequence of the reform. In any and all cases, where a morning stimulus is necessary to fortify the stomach against external influences, it cannot be doubted that a small cup of strong hot coffee

is altogether preferable.—There is much reason for believing, that an early cup of coffee, in summer and autumn, is protective against the fevers of the southern part of the Valley. Certain it is, that the French population are *less liable to them* than the Anglo-American; but as they occupy the oldest-settled portions of the country, which, *cæteris paribus*, are least affected, allowance must be made for that. In various parts of the Valley, coffee is beginning to supersede ardent spirits, as a means of support and protection under fatigue and great exposure to the elements; for which purpose, *all who have made the experiment regard it as preferable*."

On the inutility of Alcoholic liquors in warding-off any particular diseases, Dr. D. thus speaks:

"It is argued, however, that there *are* circumstances under which alcoholic drinks are specially beneficial. I may grant this; but it puts their use on a new principle, that of hygienic, or rather, medicinal influence; and limits the practice of taking them to the assigned conditions; for to be effective on *occasions*, they must not be used *habitually*. But let us inquire into these emergencies. First, It *has* been held that morning bitters, which, I have already said, were formerly in general use in families, tended to prevent the autumnal fevers which prevail in all parts of our country. But the extensive discontinuance of the practice, without any observed increase of those diseases, shows that the theory was erroneous. Second, It is well-known to the physicians of New Orleans and Mobile, that the victims of yellow fever are chiefly those who drink freely. Alcohol has no preventive power, then, over that disease; nor does it diminish the mortality among those who are attacked. Third, It is equally well-known, that other summer and autumnal epidemics, as cholera-morbus and dysentery, are not warded off by alcohol, whatever may be its value in the treatment of certain cases of those diseases. Fourth, If a moderate use of brandy or whiskey had any preventive efficacy in epidemic cholera, it was greatest in those who had previously drunk least, and only useful when the disease was forming in the system. Fifth, It is known to all the medical men of the Valley, that drinking has no power to keep off rheumatism, pneumonia, pleurisy, bronchitis, and other winter inflammations; and that those who have drunk most, are most likely to die when attacked. Sixth, Exposure to the elements is an assigned condition requiring the use of Alcohol. But the evidence is against its use, especially as compared with food and coffee, under cold or wet, and with lemonade or tea under great heat."

The following is a remarkable case which occurred during a drought of unexampled duration, which dried up the marshes, pools, and shallow rivers of the Maumee basin at the south-west angle of Lake Erie, in 1838; when the ordinary autumnal fever was raised into such an epidemic as had not been known before:—

"The excavation of the canal was at that time going on, from the mouth of the Maumee estuary, at Manhattan, up to its head, at Maumee City. The labourers, four or five hundred in number, were chiefly Irish, who generally lodged in temporary shanties, while some occupied bowers formed out of the green limbs of trees. It does not appear, that a greater proportion of these operatives suffered, than of the resident population; but a far greater proportion of those attacked, died. Professor Ackly gave me a fact, which deserves to be recorded. One contractor kept a liquor store, and sold whiskey to all whom he employed, which was drunk freely by themselves and their families. *The mortality among them was very great.* Another lodged his operatives on straw beds, in the upper rooms of a large frame house, made them retire early, and kept them from the use of whiskey; and *nearly all escaped the disease.*"

198. When the *remote* effects of the two systems are contrasted, there can be little hesitation in assigning the preference to the Abstinent plan. For, the object being to sustain the utmost *equability* of health, and especially to avoid that depressed condition which sooner or later supervenes upon states of undue excitement, it is obvious that when all the nutritive functions are reqularly and vigorously discharged, it is unwise to interfere with their performance by the use of Alcoholic liquors, which, if sufficient to produce either general stimulation, or excitement of any one function, must involve as its consequence a corresponding diminution of the normal activity at some subsequent period. It is quite true that this may not manifest itself at once; so that for weeks, months, and years, the vigour of the system may seem to be efficiently maintained, and morbific agencies to be perfectly kept at bay, by the habitual use of a small quantity of Alcoholic stimulus, to which the beneficial result will then be probably attributed. But the trial is not completed in weeks, months, or years; it must last for the whole of life; and if it be true, as advanced under a previous head, that the continued employment, however moderate, of small quantities of Alcoholic liquors, favours, if it does not necessarily induce, an early exhaustion of the vital powers, it cannot be questioned that the system will then be left in a state of peculiar susceptibility to the influence of zymotic poisons and of other morbific agencies. It is well known that persons of regular habits and good ordinary health, who have long resided in countries

where intermittent fevers prevail, are frequently attacked by them when their vital powers begin to decline with advancing years; and if that decline be hastened by the previous over-excitement of Alcoholic liquors, the influence of these morbific causes will be earlier and more powerfully exerted.

199. These theoretical deductions are not merely sanctioned by such results of experience as can be brought to bear directly upon them; for they are in complete harmony with the facts universally admitted, in regard to the peculiar susceptibility of habitually intemperate persons, and especially of those whose constitutions have been broken down by the combined influence of intemperance and advancing years, to attacks of Fever, Cholera, and other pestilential disorders (§ 74), as well as to the greater severity of these attacks. For, we again repeat, if the cause, when acting with its greatest potency, be attended with a result which no one can hesitate in accepting, it is but reasonable to attribute to the same cause, acting with diminished intensity, but over a longer period of time, a result of a similar nature; even though this may be so long postponed, that its dependence on that cause is in danger of being overlooked.

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200. We have abundant evidence, then, not merely in the experience of individuals, but in that of large bodies of men, that the most vigorous health *may be* maintained, under circumstances usually regarded as most trying to the power of bodily and mental endurance, without the assistance of Alcoholic stimulants. Such evidence is afforded by the numerous ships that are traversing every part of the wide ocean, whose crews, pledged to the Total Abstinence principle, maintain a degree of health and vigour which cannot be surpassed; by the many workshops of every kind, in which the severest labour is endured, with a constancy at least equal to that of the drinker of alcoholic beverages; by troops executing toilsome marches in the sultry heat of the torrid zone, and through the pestilential atmosphere of tropical marshes, who find the "cup of cold water" more refreshing and sustaining than the spirituous drinks which hurry so many of their comrades to an early grave; and by numbers of men and women, in every rank of life, in every

variety of condition, and subjected to every kind of mental and bodily exertion, who have given the principle of Total Abstinence a fair trial, and have borne their willing testimony to its beneficial results. And where such is the case, there can scarcely be a question that this system is preferable to the habitual use, however moderate, of Alcoholic liquors. For, if the appetite prompt to the use of an adequate amount of nourishment to repair the waste of the system; if the stomach perform its action with due energy, and supply to the absorbent vessels the material for fresh blood in a state of due preparation; if the circulation be carried on with that equable regularity which is most favourable to the actions to which it is subservient; if the various tissues draw from the current of nutritious fluid the materials which they severally require, and apply these materials to their own maintenance and regeneration; if the lungs freely exhale the carbonic acid which is evolved by their exercise, and introduce the oxygen which is needed for a renewal of Nervo-muscular effort; and if the liver, kidneys, and skin, by the constant discharge of their respective offices, eliminate from the blood the other products of the waste of the system, and thus keep it in the state of purity most favourable to the discharge of its multitudinous functions;—in a word, if all the actions concerned in the maintenance of the fabric be already discharged with that vigour and uniformity which constitutes *health*, why should we attempt to alter them by means of agents, which, *if they produce any effect whatever on the system*, can only operate by producing *a departure from that perfect balance* of the several parts of the nutritive functions, which it is so desirable to maintain, and so difficult to restore when perverted?

PROPOSITION VI.

ALTHOUGH THERE ARE CERTAIN EXCEPTIONAL CASES, IN WHICH OCCASIONAL, OR EVEN HABITUAL, RECOURSE MAY BE HAD TO ALCOHOLIC LIQUORS WITH APPARENT ADVANTAGE, THE NUMBER OF CASES IN WHICH PERMANENT BENEFIT IS GAINED BY THEIR USE, IS MUCH LESS THAN IS GENERALLY SUPPOSED; THEIR EFFECT BEING RATHER TO PALLIATE THE RESULTS OF DEPARTURES FROM THE LAWS OF HEALTH, THAN TO ANTAGONIZE OR REMOVE THEIR CAUSES; AND ANY TEMPORARY INCREASE OF POWER BEING USUALLY PURCHASED AT THE EXPENSE OF A GREATER SUBSEQUENT DIMINUTION IN THE CAPACITY OF EXERTING IT.

201. IT may be freely admitted that occasions *may* arise, when it is of the utmost importance that a certain amount of exertion (bodily or mental) should be *temporarily* made, to which the over-tasked and perhaps exhausted powers of the individual may be inadequate; and that no assistance can so effectually supply the deficient energy, as that which is afforded by Alcoholic liquors sparingly administered. But it is obvious, from the facts already stated, that their use affords *no real increase* to the strength, but that they merely *stimulate* the Nervous System to a greater intensity of action, which must occasion a more rapid metamorphosis of its substance (§ 129), and, consequently, an earlier as well as a more prolonged failure of its powers. It must not be supposed that such a disturbance of the natural course of action can *habitually* be induced with impunity. Every kind of "forcing" *must* be in the end injurious to the vital powers, and more especially to those of the Nervous System; and the more frequently and violently it is practised, the more speedily does experience show that functional derangement manifests itself.

202. So, again, there may be occasions on which individuals whose vital energies have been previously depressed by over-exertion, deficiency of food, &c., may be *temporarily* sustained under exposure to inclement weather or to morbific agencies, by the judicious use of Alcoholic liquors in

small quantities, when other sustenance is not to be obtained. Of this we have an example in the well-known case of the mutiny of the "Bounty;" in which it cannot be reasonably questioned, that the occasional administration of a tea-spoonful of rum was of the most essential service to the starving, chilled, and ocean-tossed crew of Captain Bligh's open boat, by whom hot tea, coffee, or cocoa, were no more attainable than was the substantial food which they so much needed. Yet such advantages are of a strictly *temporary* character; and so far are they from affording any ground for the *habitual* use of Alcoholic liquors, that it is invariably found the greatest benefit is derived, on such occasions, by those who have been previously of abstinent habits, and with whom, therefore, the *least* quantity of Alcoholic stimulus produces the greatest effect; and its *prolonged* employment under exposure to severe cold or other depressing influences, as already proved, soon becomes worse than useless.

203. *Sustenance of General Health.*—There is a class of cases, in which a beneficial result *appears* to be derived from the occasional, or even (for a time at least) the habitual use of Alcoholic liquors; those, namely, in which there is a want of sufficient vigour on the part of the system itself, to digest and assimilate the aliment which it really needs. Such a condition presents itself in all ranks of life.—In the higher, it too frequently results from heated rooms and late hours, from the want of regular exercise of mind and body, and from habits of self-indulgence and "coddling," which foster, especially in females, what may have been an hereditary weakness of digestive power.—In the middle classes, it is usually traceable to the "wear and tear" of professional or commercial avocations; to undue cerebral labour, carried on, as this frequently is, in ill-ventilated apartments, and to the anxieties incident to the conscientious discharge of the duties of a profession, or to the fluctuations of business.—Among the working classes, on the other hand, it is attributable rather to the condition of their dwellings, workshops, and persons; to the want of ventilation of the buildings in which they dwell or labour; to the miasmatic atmosphere of their ill-drained streets, and to the foulness of their skins and garments.

204. Now in the *first* of these groups, it is obvious that the want of appetite is a natural result of systematic violation of the laws of health; and that the use of Alcoholic stimulants can only serve as a temporary palliation of the deficiency. The true cure for this condition lies in such an entire change of habits, as shall place the system in the condition most favourable to the recovery of its vigour, or to the acquirement of that which it has never enjoyed;—the substitution of fresh air and bracing breezes, for heated and ill-ventilated rooms; of early and regular hours, for the system of turning night into day and day into night; of plain but wholesome fare, for seasoned dishes and refined cookery; of the use of even a weakly pair of limbs, for that of a carriage and horses; and of labour in behalf of others, for the weariness of ennui or continual thought of self.

205. This is no less true of the *second* class of cases, in which the deficiency of appetite is jointly attributable to exhaustion of nervous power, and to disorders of bodily health, both of them consequent upon long persistence in injurious habits. The true remedy is obviously to be found in such a change in these, as shall bring back the system as nearly as possible to its natural state. The intellectual labour must be moderated; the mind must be prevented from dwelling on its own sources of anxiety, by the healthful influences of social and domestic intercourse, of variety of occupation, and of objects that shall interest without exciting it; and the body must be placed, by regular exercise, fresh air, and adequate repose, in the most favourable condition for the endurance of mental labour. To prefer to such *natural* means of sustaining the vigour of health, the *artificial* and delusive aid of Alcoholic liquors, is to act like the extravagant trader who bolsters-up his failing credit with accommodation-bills, instead of restricting his expenditure within his legitimate profits; and thus to carry onwards, from page to page of the ledger of life, a heavy balance, which *must* be accounted for at some subsequent period.

206. In regard to the *third* class of such cases, it is yet more obvious that the failure of digestive power, and consequently of general vigour, is to be charged upon the unwholesome conditions under which the labour is performed, that labour being in itself provocative of appetite, and

invigorating to the system generally; and that the true remedy is to be sought in pure air and personal cleanliness. When, in place of this, recourse is had to Alcoholic liquors, it is uniformly found that the amount of stimulus which at first seemed adequate, speedily ceases to produce its usual effect; and that the feeling of necessity for it increases, the more it is used.

Of this, we have an example—which, though an extreme case, teaches the lesson with the force that extreme cases alone can do—in the condition of the journeyman Tailors employed in the large London workshops, as disclosed by the inquiries whose results are published in the first "Sanitary Report" (1842). The heat and closeness of the workshops were stated by the witnesses to be such, that on the coldest nights of winter, large thick tallow candles melted and fell-over with the heat; and fresh hands from the country fainted away. In order to get the strength up for the day's work, and to create an appetite for breakfast, it was customary to take a glass of gin at seven o'clock in the morning; and this was repeated three or four times in the subsequent ten hours. Now the utter inability of the Alcoholic stimulus to afford more than a temporary power of endurance under such a state of things, and the cumulative effect of the noxious atmosphere on the one hand, and of the habitual use of spirits on the other, are fearfully shown in the excessive mortality among this class of men, especially from consumption; their *average age* not being above *thirty-two*, and a man of *fifty* being considered as *superannuated*.—The Author has been informed that these workshops have been greatly improved of late years, especially in regard to ventilation; and that the craving for spirits, on the part of those employed in them, has gradually ceased to manifest itself.

Nothing can be more absurd, then, than to maintain that any real benefit is derived from Alcoholic liquors in such cases; or that they can in the least degree supply the place of pure air, or make-up for the want of personal cleanliness. These agencies can only be remedied by their proper antagonistic measures;—hot and foul air by proper ventilation and efficient sewerage; filthiness of the skin and garments by the use of baths and wash-houses;—and if they be allowed to continue, they *must* exert their influence on the bodily system, all the Alcohol in the world notwithstanding.

207. On the whole, then, we may conclude that in by far the greater number of cases falling under one or other of the above categories, the influence of the habitual use of Alcoholic liquors, while it may seem temporarily beneficial,

is in the end pernicious rather than otherwise; and this not only by their own specific effects on the system, but also by causing the individual to *feel* less need of the very change which is needed for the restoration of the body to its wonted vigour. The insensibility to the effects of various causes of disease, which the habitual use of these stimulants induces, and the *toleration* of them which it thus permits, may be regarded, indeed, as one of its most injurious results. Those who are prevented from feeling the *immediate* consequences of their improper course, flatter themselves that they are uninfluenced by them, and give to their wine, their spirits, or their beer, the credit of the escape. But this is far from being the case. The enemy is only baffled, not dispersed; and although he lies concealed for a time, he only waits until his onslaught may be more effectually made. Any systematic departure from the laws of health—all experience teaches—*must* exert its influence on the system, sooner or later; the sooner it does so, the more readily may the mischief usually be corrected; whilst the postponement of its effects tends to render the process of cure as protracted as the operation of the causes has been. It is one of the greatest benefits of the Abstinent system, then, that by making the evils of such a departure less endurable, it sooner prompts the sufferer to seek a remedy.

208. *Lactation.*—The benefit supposed to be derived from the use of Alcoholic liquors during *suckling*, is very doubtful. Certainly it may be affirmed that in every case in which the appetite is good and the general system healthy, the habitual use of these stimulants is no more called-for than at at any other time; and that they are likely to produce the same injurious effects, as when unnecessarily given under ordinary circumstances. The regular administration of Alcohol, with the professed object of "supporting the system" under the demand occasioned by the flow of milk, is "a mockery, a delusion, and a snare;" for Alcohol affords no single element of the secretion; and is much more likely (as shown by the results of its *excessive* employment) to impair than to improve the quality of the milk, and thus to produce derangement of health on the part of the infant. Where the appetite already prompts to the *in*gestion, and the stomach is equal to the *di*gestion, of an adequate amount of

solid food, of an appropriate kind,* no benefit can be looked for from their use; and the only cases in which there is even a shadow of advantage in their employment, are those wherein, notwithstanding all that can be done to promote the general health, the stomach does not seem capable of retaining and digesting the requisite amount of nutriment, without some artificial assistance. But here, as in the cases previously discussed, the practice is *in the end most detrimental*, by causing lactation to be persevered in, without apparent injury at the time, by females whose bodily vigour is not adequate to sustain it. As Dr. Macnish has justly remarked, "if a woman cannot afford the necessary supply without these indulgences, she should give over the infant to some one who can, and drop nursing altogether."

209. *Childhood.*—There cannot be any reasonable doubt, that the habitual use of Alcoholic liquors by children in average health, is in every way injurious. In no period of life are the nutritive functions more energetically carried-on, if the child be only placed in circumstances favourable to health; and at no period of life is there such a disposition to make just that amount of bodily and mental exertion which is beneficial to the system, without exceeding it. The chief thing to be watched-for and avoided, is the excess in diet to which children are sometimes prone, more especially if their palates be tempted by articles of which they are fond; and if this be duly restrained, and every *natural* means for the preservation and improvement of health be judiciously and perseveringly employed, it is the Author's firm conviction that far more good will be attained, in the end, than by the (supposed) assistance of Alcoholic liquors. In support of this conviction, he can appeal to the large numbers of families now growing up in this country and in America, in the enjoyment of vigorous health, among whom no Alcoholic liquor is ever consumed; and he can point to numerous cases within his personal knowledge, in which—the apparent debility of constitution having been such, as, in the opinion of some, to call for the assistance of fermented liquors,—that advice was resisted, and those other

* The diet especially appropriate for a nurse, is that which contains most of the elements of milk, such as oatmeal-porridge, gruel, arrow-root, sago, and other farinaceous substances, *with milk*.

means adopted which have been already adverted-to, with the effect of rearing to vigour and endurance, children that originally appeared very unlikely to possess either. Upon all *Conductors of Schools*, therefore, he would especially urge the duty, both on moral and physical grounds, of bringing up the young in habitual Abstinence from Alcoholic liquors of every kind.

210. *Old Age.*—It has been maintained, by some of those who fully admit the undesirableness of the habitual use of Alcoholic liquors during the vigour of early and middle life, that they are requisite or useful for the support of *old age.* Now upon this point, also, the writer believes that much misconception is prevalent, arising out of a disregard to the dictates of Nature on the subject. With the advance of years, as the power of activity diminishes, the body (so to speak) lives much more slowly; and the waste being thus lessened, the demand for food, and the power of digesting it, are proportionably diminished. This abatement of the appetite and digestive power is a natural warning that a smaller amount of food should be taken-in; and if it be so received, and no more nutriment be habitually ingested than the appetite legitimately prompts, the digestive powers will be found as adequate as in a state of greater activity, to provide for the wants of the system. But this abatement is very commonly regarded as an indication of the failure of the powers of the stomach; and recourse is had to Alcoholic liquors with the view of re-exciting these,—a practice which is fraught with evil, not only by exhausting, while it seems to strengthen, the digestive power which yet remains, but also by forcing admission into the system, for a larger amount of alimentary matter than it can appropriate. For as all the excretory organs which are set apart for the elimination of the superfluity, are less easily stimulated to increased activity in the decline of life than at an earlier period, it follows that habitual excess in diet, even though to no great amount, is yet more likely to be followed by the disorders which it always tends to produce. And hence it is, more especially, that we find gout, gravel, and other allied disorders, so prone to manifest themselves in advanced life, and requiring such careful dietetic management for their correction.

PROPOSITION VII.

Whilst the habitual use of Alcoholic Liquors, even in the most moderate amount, is likely (except in a few rare cases) to be injurious, great benefit may be derived in the treatment of DISEASE, from the Medicinal use of Alcohol in appropriate cases.

211. Those who maintain that Alcoholic liquors are not requisite for the ordinary sustenance of Man, or even that they are likely to be rather prejudicial than otherwise when habitually taken in small quantities,—that, in fact, Alcohol is to almost every one a true *poison*, slower or more rapid in its operation, according to the rate at which it is taken, —may still maintain with perfect consistency, that it may be a most valuable *remedy*, when administered with caution and discrimination, in various forms of Disease. For if the medicinal use of Alcohol be interdicted, on the ground of its poisonous character, the same rule, extended to other substances, would deprive the Physician of *every* one of the medicines which are most valued by him, on account of the powerful influence which they exert on the system. The very action which is most injurious to the body in Health, and which may cause the most serious derangement of its functions, may be most beneficial in Disease, by its opposition to some other disordered action, which, unless thus kept in check, would be productive of the most serious consequences. Thus, in certain states of restless but perverted activity of the brain, one form of which is known as *Delirium Tremens* (§ 26), whilst another form is the frequent precursor of an attack of Mania, large and repeated doses of Opium, such as might even produce fatal stupefaction in a healthy subject, are of the greatest value, by procuring a temporary quietude, during which the nutritive operations may have time to exert themselves for the healthful reparation of the Nervous substance.—It is, indeed, an ancient adage, that "the more violent the poison, the more potent the remedy;" that is, the greater the alteration a particular substance induces in

the ordinary current of vital action, the more powerful is its operation as a medicine, when that alteration serves to *rectify* or to *keep in check* some other departure from the ordinary course of health. And thus it is, that Prussic acid, Strychnine, Opium, Arsenic, Corrosive Sublimate, and other substances which are among the most virulent poisons known to us, are also among our most valuable medicines. The case is in no respect different in regard to Alcohol, whose specific action on the system, when judiciously brought into play, can, on certain occasions, exert a beneficial influence which nothing else can afford; and to put this aside, in *really appropriate* cases, because we affirm it to be injurious to the healthy system, would be equivalent to denying our right to employ any substance whatever as a medicine which is not wholesome as food,—a doctrine that would deprive us of *all* the medicines in the Pharmacopœia.

212. It would not be appropriate to the character of this Treatise, to do more than indicate briefly the *classes* of cases, in which the medicinal employment of Alcohol can be most safely based on its known properties.—We have seen that Alcohol, when introduced into the circulation, acts as a stimulant in augmenting the force and rapidity of the Heart's contractions, and that it also increases the excitability of the Nervous System; hence we should say that Alcoholic liquors may be advantageously employed to assist in rousing the system from the depressing effects of injuries of various kinds, which produce a violent *shock*, under the primary effect of which the vital powers appear likely to sink.

There is no class of cases, perhaps, in which these good effects are more manifest, than in those severe and extensive burns of the trunk of the body, to which the children of the lower classes are peculiarly liable, from their clothes taking fire through carelessness or negligence. The shock given by this injury to the delicate and impressible system of the child is often rapidly fatal; the heart's action being extremely depressed, the nervous power reduced, and the body gradually cooling, its temperature falls to a degree incompatible with the maintenance of life. The writer has witnessed many such cases, in which life seemed to be kept in the body by the frequent administration of a spoonful of cordial, but in which death supervened upon a short intermission of the stimulus, — the nurses in Hospitals being generally possessed with the belief that the little patients *must* die, and being too frequently careless in the employment of the only means by which life can be sustained.

213. In cases of this kind, the shock is temporary; and if the patient can be *kept alive* until the system has recovered from its immediate consequences, a great point is gained. But there is another class of cases, in which, the depression being produced by the poison of some specific disease of limited duration, it is of equal importance to keep up the vital powers for a longer time; since, if they can be sustained for a few days or weeks, the patient has a fair chance for recovery. Of such we have examples in many forms of Fever; especially those which exert their noxious influence, rather in producing a general depression of the vital powers, than in occasioning any decided local disorder. No two epidemics of fever are precisely alike; and the treatment which is of service in one may be found injurious in the other, notwithstanding that the general type may be the same. It is, therefore, just as absurd to say that, because fever-patients often recover best without wine, it is not required in *any* case of fever,—as it would to affirm that, because wine is undoubtedly beneficial in some forms of fever, it must, therefore, be so in *all*. Every epidemic, indeed each individual case, must be treated according to its peculiarities; and the experienced Physician will seldom be at a loss to decide when Alcoholic stimulants are *beneficial*, and when *injurious*, in the treatment of Fever.

A severe epidemic of typhoid fever, which the writer witnessed in Edinburgh in the years 1836–7, afforded him an opportunity of seeing the decided efficacy of Alcoholic stimulants in one form at least of this fever; the opposite methods of treatment, followed by two physicians whose practice he watched, being attended with such different results, that, as the cases were of the same class, and the other conditions identical, there was no other way of accounting for the difference. By neither physician were any active measures taken during the early stages of the fever, for none seemed called for; but in one set of cases, the same expectant practice was continued to the end; whilst in the other, the administration of wine and spirit was commenced, as soon as the weakness of the pulse, and the coldness of the extremities, indicated the incipient failure of the circulating and heat-sustaining powers. The quantity was increased as the necessities of the patient seemed to require; and in one case (that of a woman whose habits had been previously intemperate, and on whom a more potent stimulus was therefore needed to make an impression), a bottle of sherry with twelve ounces of whiskey was the daily allowance for a week or more,—the patient ultimately recovering. Now the result of this wine-treatment was, that the mortality was *not above a third* of that of the simple

expectant treatment; the patients dying under the latter from actual exhaustion and failure of heat-producing power, and no local disorder being detectible on post-mortem examination.

214. Now in the cases in which the Alcohol is thus useful, there is *an entire absence of stimulating effects.* This is probably due in part to the fact, that the Alcohol is burned-off nearly as fast as it is introduced, in order to supply the combustive process, which would otherwise fail for want of material, the *pabulum* which the body originally contained having been gradually consumed during the previous illness; but it would also appear to result in part from this,—that the *stimulating* power of the Alcohol is expended in neutralizing (so to speak) the *depressing* influence of the fever-poison already in the system; and that it simply tends, therefore, to *restore* both the heart and the brain to their condition of *normal activity.* For the heart's action becomes *slower* and more vigorous, instead of being quickened; and the delirious activity of the brain is *tranquillized*, instead of being more violently excited. Where the habits of the patient have been previously intemperate, the ordinary doses of alcoholic stimulants have no perceptible effect; and it is necessary to go on increasing them, until some marked influence is exerted by them, as in the case just now cited.—So, again, in that typhoid form of Erysipelas, which so often presents itself in men of the bad habit of body resulting from habitual intemperance (§ 72), very large quantities of alcoholic stimulants may be given, without any other perceptible effect than that most beneficial one—the support of the system whilst the disease runs its course.

215. During the stage of convalescence from Fevers and acute Inflammatory diseases in which the vital powers have been greatly depressed, it will frequently happen that the use of Alcoholic liquors will be decidedly beneficial; and this apparently in two ways,—by raising the nervous system from that low irritative state which is the consequence of depressed vital power,—and by increasing the digestive power of the stomach and the general nutritive activity of the system, so that the reparative processes take place more rapidly, and the general vigour is more speedily restored. Every practical man must have perceived, that the state of debility in which the patient is left after the termination of

an acute disease, is extremely different from the state of exhaustion consequent upon a long-continued course of over-excitement. The former partakes of the nature of *shock;* the vital powers are not so much *exhausted*, as *depressed;* and recovery is best promoted by arousing the system, so far as possible, to the due performance of its functions. When Alcoholic stimulants are really beneficial under such circumstances, they make their utility apparent in the same way as in the advanced stage of typhoid fever,—that is, by *reducing* the rapidity of the heart's action, at the same time that its strength increases, and by *calming* the mind instead of exciting it.—When Alcoholic stimulants are employed for such purposes, the greatest care and watchfulness should be used in their administration; both to guard against doing positive mischief by an over-dose; and also to avoid bringing the system into a habit of dependence upon them, and thereby predisposing it to the various remoter evils formerly described. There is no doubt that a course of over-indulgence in Alcoholic liquors has frequently commenced with the medicinal use of them; and it is extremely desirable, therefore, that the medical practitioner should enforce the diminution of the dose, and the final discontinuance of the remedy, at the earliest possible period,—substituting, if he should think it desirable, a small quantity of alcohol in some *medicinal* form,—in order that the patient may have as little motive as possible for continuing its use, after the time for their really beneficial action has passed.

216. Again, the stimulating action of Alcoholic liquors may be had recourse to with advantage, in cases in which there is a great drain upon the nutritive material, owing to some disordered action which at the same time lowers the vital powers of the system,—such, especially, as an extensive discharging surface. Now here the general rule of health, that the appetite and the digestive power are proportionate to the demand for nutriment in the body, does not hold good; since the depressing influence of the disease lowers the functional activity of the digestive apparatus, to such a degree that it cannot supply what is needed; and thus there is a progressive diminution of the nutritive solids of the blood, which still further depresses the vital powers of the system. Experience shows that, as theory would lead us to anticipate, Alcoholic liquors may be beneficially employed

under such circumstances, not for the sake of stimulating the heart or the nervous system, or as a substitute for solid food; but, on the other hand, by moderately stimulating the digestive power, to augment the quantity of this which the stomach can advantageously receive, and thus to supply the system with the nutritive material of which it stands in especial need.

217. The different kinds of Alcoholic Liquors must not be used indiscriminately in these varying conditions; for their operation upon the system differs considerably; and there are certain conditions of the body, to which each is especially appropriate. Thus, *distilled spirit* is the most rapid and powerful in its action upon the heart and nervous system; and hence it is the most potent form of alcoholic liquor, in those states of alarming depression from which we desire to rouse the patient as rapidly as possible. We find, too, that it is frequently requisite to administer spirits to patients who have been in the habit of free or excessive indulgence in alcoholic liquors, under circumstances in which wine would otherwise be preferable, *e. g.* in Fever; the milder stimulus, in such cases, not producing the effect we desire. Where, however, we desire to give more continued support, with less of stimulation, it is not usually desirable to administer distilled spirit, and *wine* will be found the preferable form; this is especially the case in the ordinary forms of fever, and in convalescence from acute diseases. On the other hand, where we desire to give still greater support with as little stimulation as possible, as in the class of cases last referred to, *malt-liquor* may be more advantageously employed; for the alcohol, probably from its peculiar state of admixture, is less disposed to exert its remote effects, and the nutritive matter with which it is combined is in itself beneficial; whilst the bitter and somewhat calmative properties of the hop aid in producing the desired effect upon the stomach.

218. Of the use of Alcoholic liquors in the treatment of *chronic* diseases, it becomes us to speak with much greater caution; the condition of the system under the *depressing* influence of "shock" or of poisonous agents, being very different from that which results from the *exhaustion* of its powers through chronic diseases, although debility is a characteristic of both. Whilst fully recognizing their value in

the former case, the writer believes that little permanent good can be expected from the use of alcoholic liquors in the latter, so far, at least, as regards their stimulant operation upon the heart and nervous system; and what benefit they are capable of conferring, will be obtained by their improvement of the digestive power, and of the processes of primary assimilation. But it is certain that such temporary improvement is too often fallacious,—like that which we see in the burning of a lamp, just after the raising of the wick, when there is a deficiency of oil,—since it is procured, not by the re-animation of power which exists in the body though previously lying dormant, but by the more rapid consumption of the small stock of power left. And the question of their benefit or injury will often depend upon whether, through this more rapid consumption, new vigour can be infused into the system by the introduction of new material.

219. It is a very common idea, that the use of Alcoholic stimulants is beneficial, when the digestive power has been weakened by some habitual departure from the laws of health, such as excess in diet, indulgence in a "moderate" allowance of fermented liquors, and exhaustion of the nervous power by continued over-exertion or anxiety of mind. Now it is quite absurd to expect that any change or variety of direct stimulation can permanently re-invigorate the digestive apparatus under such circumstances. The medical attendant may keep his patient in town at his usual occupation, practise all kinds of experiments upon his stomach, recommend fat bacon or lean chops, prescribe blue pill and senna-draught, or quinine and calumbo, and ring the changes upon all the wines, spirits, and malt-liquors which the cellar can furnish, without effecting any permanent benefit. Whereas if the patient can be induced to give himself a complete holiday, to betake himself to some agreeable spot where there is sufficient to interest, but nothing to excite; to inhale the fresh and invigorating breezes of a mountainous country, in place of the close and deteriorated atmosphere of a town; to promote the copious action of his skin by exercise, sweating, and free ablution; to wash out his inside, and increase the tonic power of his stomach, with occasional (but not excessive) draughts of cold water; and to trust to the natural call of appetite alone, in

preference to artificial provocatives;—he will be resorting to the most *probable*, because the most *natural* means of permanent restoration to health. It is only where this cannot be accomplished, and there is unfortunately but *a choice of evils* both for doctor and patient, that it will come to be considered whether it is preferable to have habitual recourse to such an allowance of Alcoholic stimulants, as may enable the stomach to digest the food which the system really requires, and thus to keep up the struggle against disease, until circumstances may admit of a change of plan, or until it can be sustained no longer,—or whether it is better to allow its powers to decline, for want of the sustenance which is essential to their preservation.

220. The same question has to be put, with reference to a class of individuals who can scarcely be regarded as subjects of *disease*, but in whom the conditions are essentially different from those of *health*. These are such as, from constitutional debility, or early habits, or some other cause that does not admit of rectification, labour under an habitual deficiency of appetite and digestive power, even when they are living under circumstances generally most favourable to vigour, and when there is no indication of disordered action in any organ,—all that is needed being a slight increase in the capacity for *preparing* the aliment which the body really needs. Experience affords ample evidence that there *are* such cases, especially among those engaged in avocations which involve a good deal of mental activity; and that, *with* the assistance of a small but habitual allowance of Alcoholic stimulants, a long life of active exertion may be sustained;* whilst the vital powers would speedily fail *without* their aid, not for the want of direct support

* A characteristic example of this kind was presented by the late Dr. Joseph Clarke of Dublin, who lived to the age of seventy-six years; and who, with such assistance as is indicated above, discharged the duties of a laborious profession, with scarcely any intermission, to the end of his life; although, at the commencement of his career, it seemed probable that he would soon be forced to relinquish them, in consequence of the weakness of his digestive power.—The Author has under his constant observation a similar case, in which he is satisfied, from long and varied experience, that the assistance of Alcoholic beverages, *limited as above stated*, has conduced most effectually to the support of the system in ordinary health.

from them, but for the want of the measure of food which the system really needs, and which no other means seems so effectual in enabling it to appropriate. It is characteristic of these cases, that the Alcoholic stimulant seems to act upon the stomach, as it does upon the system at large when depressed by the shock of an injury or morbid poison (§§ 213—215); never stimulating it to an abnormal activity, but simply keeping it up to its normal standard. In this class of cases, it is important to observe, that there is not found to be that necessity for the increase of the dose with the lapse of time, which presents itself in those in which it is hurtful, because unnecessary. To withhold the assistance of Alcoholic stimulants (it is in their very mildest form, such as that of bitter ale, that they are most beneficial) in such cases, would often be to condemn the individuals in question to a life-long debility, incapacitating them from all activity of exertion in behalf of themselves or others, and rendering them susceptible to a variety of other causes of disease. For it seems to be the peculiar character of this condition, that no other medicine can supply what is wanting, with the same effect as a small quantity of an Alcoholic beverage, taken with the principal meal of the day; and there is nothing opposed to the general doctrines previously insisted-on, with regard to the ultimate effects of the habitual use of Alcoholic stimulants, in the admission that, under the circumstances already named, it is *the least evil of the two*.—But the Author, whilst strenuously upholding the right of the medical practitioner to recommend this medicinal use of Alcohol, where he feels satisfied that it is called-for, would also strongly urge the duty of *not* having recourse to it, till all the *more natural* means of invigorating the digestive powers shall have been practised without success.

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